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Evaluating the Effectiveness of the 2001–2002 NASA "Why?" Files Program

Thomas E. Pinelli
Langley Research Center, Hampton, Virginia

Kari Lou Frank and Matthew A. Lambert
College of William and Mary, Williamsburg, Virginia

November 2002

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National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23681-2199

November 2002

Announcement

In 2002 the NASA “Why?” Files became the NASA SCIence Files™ (also known as the NASA SCI Files™).

Available from:

NASA Center for AeroSpace Information (CASI)
7121 Standard Drive
Hanover, MD 21076-1320
(301) 621-0390

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161-2171
(703) 605-6000

Summary

The NASA "Why?" Files is a research and standards-based, Emmy® award-winning series of 60-minute instructional programs for students in grades 3–5. Programs are designed to introduce students to NASA; to integrate mathematics, science, and technology through the use of Problem-Based Learning (PBL), scientific inquiry, and the scientific method; and to motivate students to become critical thinkers and active problem solvers. Each of the four programs in the 2001-2002 NASA "Why?" files series includes an instructional broadcast, a companion educator's (lesson) guide, an interactive web site that features a PBL activity, plus a wealth of instructional resources. In March 2002, a self-reported survey booklet was mailed to a randomly selected sample of 1,000 NASA "Why?" Files registrants. Of these surveys, 139 (102 usable) were returned by the established cut-off date. Most of the survey questions employed a 5-point Likert-type response scale. Survey topics included (1) instructional technology and teaching, (2) instructional programming and technology in the classroom, (3) the NASA "Why?" Files program (television, lesson guide, classroom activity, web-based activity, and web site), (4) classroom environment, and (5) demographics. About 72 percent of the respondents were female, 72 respondents identified "classroom teacher" as their present professional duty, about 80 percent worked in a public school, and about 55 percent held a master's degree or master's equivalency. Regarding the NASA "Why?" Files, respondents reported that (1) they used the four programs in the 2000-2001 NASA "Why?" Files series; (2) the goals and objectives for the series were met ($\bar{x}$ = 4.53); (3) the programs were aligned with the national mathematics, science, and technology standards ($\bar{x}$ = 4.71); (4) the program content was developmentally appropriate for grade level ($\bar{x}$ = 4.50); and (5) the programs in the series enhanced the teaching of mathematics, science, and technology ($\bar{x}$ = 4.54).

Introduction

The NASA Langley Research Center's Office of Education (OEd) has primary responsibility within the Agency for the development of instructional distance learning programs and for the integration of instructional technology. Through the NASA Center for Distance Learning, the OEd has developed a suite of five distance learning programs. Collectively, the goals of the four programs include (1) increasing educational excellence; (2) enhancing and enriching the teaching and learning of mathematics, science, and technology; (3) increasing scientific and technological literacy; and (4) communicating the results of NASA discovery, exploration, innovation, and research. The NASA "Why?" Files airs nationally on Cable Access, ITV (instructional television), and PBS-member stations. Presently, 198,395 educators representing 4,416,109 students in 50 states have registered for the NASA "Why?" Files. Information about the NASA "Why?" Files can be found at the following web site: http://whyfiles.larc.nasa.gov

Evaluation is critical to any program's success. To determine the effectiveness as well as the credibility and validity of the series, we survey NASA "Why?" Files registrants annually. This report contains the quantitative and qualitative results of our attempt to determine the effectiveness of the 2001-2002 NASA "Why?" Files series. Also included in this report are suggestions for the improvement of the NASA "Why?" Files.

Overview of NASA "Why?" Files

Produced by the Office of Education at NASA's Langley Research Center in Hampton, Virginia, the NASA "Why?" Files is designed to increase scientific literacy, improve the mathematics and science proficiency of students in grades 3–5, and increase the competency of mathematics and science educators. Now beginning its fourth year of production, the goals of this research and standards-based, Emmy® award-winning distance learning program include (1) showing students the application of mathematics, science, and technology on the job; (2) presenting mathematics, science, and technology as

disciplines that require creativity, critical thinking, and problem-solving skills; (3) demonstrating the integration of workplace mathematics, science, and technology as a collaborative process; (4) raising student awareness about careers that require mathematics, science, and technology; and (5) overcoming stereotyped beliefs by presenting women and minorities performing challenging engineering and science tasks.

The 2001-2002 NASA "Why?" Files series is the recipient of numerous awards for program achievement, educational content, web site content, and video production. At the 2001 Mid-Atlantic Emmy® Awards, the NASA "Why?" Files won an Emmy® for Best Children's Series. Other awards for the 2001-2002 NASA "Why?" Files season include a 2001 Apex Grand Award based on excellence in graphic design and editorial content for the NASA "Why?" Files web site, and a 2002 Mid-South Regional Emmy® Award in the category of Best Children's Educational Program for *The Case of the Challenging Flight.* A complete list of the awards received by the NASA "Why?" Files can be found at http://whyfiles.larc.nasa.gov/text/awards.html.

The NASA "Why?" Files is the second oldest program in the K–12 (precollege) distance learning initiative. In addition to the goals listed in the Overview, the NASA "Why?" Files also seeks to create opportunities for parental and community involvement, attempts to link formal education (e.g., the school) with informal education (e.g., libraries, museums, and science centers), and also to link pre-service and in-service education. The NASA "Why?" Files model is research and standards based, instructional rather than educational, result oriented, learner centered, technology focused, and feedback driven. NASA "Why?" Files is free to educators; however, educators must register to receive the lesson (teacher) guides. There are four ways to register for the NASA "Why?" Files:

1. e-mail whyfiles@edu.larc.nasa.gov
2. online http://edu.larc.nasa.gov/whyfiles/
3. telephone 757-864-6100
4. U.S. mail: NASA "Why?" Files
   Mail Stop 400, Office of Education
   NASA Langley Research Center
   Hampton, VA 23681-2199

The number of teachers registering for and the number of students viewing each program must be specified.

Rights and Responsibilities

NASA "Why?" Files is a U.S. Government program and is not subject to copyright. No fees or licensing agreements are required to use programs in this series. Off-air rights are granted in perpetuity. Educators are granted unlimited rights for duplication, dubbing, broadcasting, cable casting, and web casting into perpetuity, with the understanding that all NASA "Why?" Files materials will be used for educational purposes. Neither the broadcast nor the lesson guide may be used, either in whole or in part, for commercial purposes without the express written consent of the NASA "Why?" Files.

Production and Delivery

Programs in the 2001-2002 NASA "Why?" Files series are live, 60-minute broadcasts. They comply with the specifications found in the National Educational Telecommunications Association (NETA) Common-Sense Guide to Technical Excellence. Each program is broadcast (delivered) via KU- and

C-band satellite transmission. Public Television System (PBS) affiliates, statewide television systems such as T-STAR, district wide television systems, and cable access channels carry the NASA "Why?" Files, and the program is also web cast via the NASA Learning Technology Channel. The NASA "Why?" Files web site has the satellite coordinates and broadcast dates and times.

Availability

For a minimal fee, educators can obtain the NASA "Why?" Files videos and print materials from the NASA Central Operation of Resources for Educators (CORE). Videos and print materials are also available from the NASA Educator Resource Center (ERC).

NASA CORE
15181 State Route 58 South
Oberlin, OH 44074-9799
Phone: (440) 775-1400
Fax: (440) 775-1460
E-mail: nasaco@leeca.esu.k12.oh.us
URL: http://CORE.spacelink.nasa.gov

The Importance of Evaluation

Formative and summative evaluation is critical to any program's success. A 2001 CEO Forum School Technology and Reading Report states, "[a]ssessment should become an ongoing part of instruction to inform and enhance teaching and learning and to promote student achievement" (CEO Forum, 2001). NASA "Why?" Files is a tool for enhancement and enrichment, and the only way to gauge the effectiveness of that tool is to assess how it is being used by classroom teachers. Evaluation is important for numerous reasons, and it plays an important role in the evolution of distance education (Hawkes, 1996). First, evaluation improves the credibility and validity of a program (Wade, 1999). Second, evaluation can be used to make changes in the program (Ramirez, 1999), which is particularly important because of the dynamism inherent both in education and technology. According to Dr. Lawrence T. Frase, Executive Director of the Research Division of Cognitive and Instructional Science at the Educational Testing Service, "The major issue for educational technology in the next millennium will be the effectiveness of its adaptation to social, scientific, and political change" (*THE Journal*, 2000). Third and finally, evaluation can help determine the effectiveness of a program (Hazari and Schnorr, 1999). Because of the wide array of information we can reap from the evaluation process, NASA's Center for Distance Learning conducts an ongoing quantitative and qualitative assessment of each of its programs, including the NASA "Why?" Files.

The 2001-2002 season was the second in which the NASA "Why?" Files underwent a rigorous quantitative and qualitative evaluation. National data concerning teacher demographics, classroom environments, and teacher perceptions of instructional technology have been infused into the 2001-2002 NASA "Why?" Files evaluation report, thus allowing the data received through the NASA "Why?" Files evaluation process to be compared to other national studies. In future seasons, the Office of Education may seek to expand evaluation to also include classroom observation by skilled observers and student feedback by means of short surveys. In summary, the Office of Education continually strives to improve the evaluation process by creating more diverse and in-depth measurement techniques. As stated by Michael Hawkes (1996), "[b]y using an array of evaluation techniques and including everyone involved in the delivery of distance learning (parents, teachers, students) in data collection activities, evaluation tasks will not appear

as ominous as they once did. More importantly, school leaders will be able to assess whether distance education technologies are part of the solution to improved learning and instruction" (page 33).

Methodology

A sample of 1,000 registrants was randomly drawn from the NASA "Why?" Files database. A self-reported survey/questionnaire was mailed to the sample group in early March 2002. The survey contained 118 questions, 10 of which dealt with demographics (appendix A). Those receiving the survey had two options: (1) they could complete the survey and return it, or (2) they could write "not applicable" on the survey and return it. Respondents also had the option to request a free copy of the final assessment report (all individuals who returned a survey received a complimentary NASA educational CD-ROM). By the established cut-off date, we received 102 usable surveys and an additional 37 surveys marked "not applicable." Reasons given for not completing the survey were logged in the database (appendix B). The overall response rate for the 2001-2002 NASA "Why?" Files evaluation project, with only one mailing, was approximately 13.9 percent.

In addition to the quantitative data collected, we also recorded all qualitative data received during the 2000-2001 NASA "Why?" Files season. These comments came from the evaluation booklet, e-mail correspondence with educators, traditional mailings to educators, and telephone conversations. Comments are divided into two categories: Responses to Qualitative Questions in the 2001-2002 Evaluation Booklet (appendix C) and Unsolicited Qualitative Comments (appendix D). The qualitative data collected were also incorporated into the changes suggested for the 2002-2003 NASA "Why?" Files season. Note that in 2002, the NASA "Why?" Files will become the NASA SCIence Files™ (and will also be known as the NASA SCI Files™).

Demographics

The evaluation booklet contains a variety of demographic questions, the answers to which can help us establish each respondent's profile and classroom environment and determine teacher/student computer use. Demographic findings for survey respondents follow:

- About 72 percent of the respondents were female.
- About 32 percent of the respondents were in suburban school districts, 34 percent in rural school districts, and 34 percent in urban school districts.
- 72 of the respondents identified "classroom teacher" as their present professional duty.
- About 80 percent of the respondents worked in public schools.
- About 55 percent of the respondents held a master's degree or master's equivalency.
- About 89 percent of respondents identified themselves as Caucasian.
- The mean and median ages of the respondents were 47.60 and 49, respectively.
- The mean and median "years as a professional educator" were 19.91 and 20, respectively.
- About 96 percent of the respondents owned a personal computer.

Presentation of Data

The survey questions were divided among eight topics. Respondents were asked to react to questions about instructional technology and programming and its use in the classroom and to items specifically related to the NASA "Why?" Files series. Findings for the eight topics are presented in this section. The topic results are reported in terms of mean (average) ratings when the survey items involved a 5-point Likert scale and in percentages when the questions required other responses. Mean values appear in parentheses following appropriate questions, and where available, they will be succeeded by the mean value of last year's (2000-2001) data. For example, $\bar{x}$ = 4.0; $\bar{x}$ = 3.9 signify that 4.0 is the mean of the 2001-2002 data and 3.9 is the mean of the data from 2000-2001. Each question was calculated by using the number of responses to that particular question (n) rather than the total population of respondents (N).

Topic 1. Instructional Technology and Teaching

We asked respondents to rate seven statements related to instructional technology and teaching (table 1). The highest mean rating ($\bar{x}$ = 4.63; $\bar{x}$ = 4.53) was given to the statement that *instructional technology enables teachers to accommodate different learning styles*. The next highest mean ratings were given to the statements that *technology enables teachers to teach more effectively* ($\bar{x}$ = 4.61; $\bar{x}$ = 4.42), *enables teachers to be more creative* ($\bar{x}$ = 4.60; $\bar{x}$ = 4.50), and *increases student motivation and enthusiasm for learning* ($\bar{x}$ = 4.56; $\bar{x}$ = 4.51). At slightly lower mean ratings, respondents reported that *instructional technology increases student learning and comprehension* ($\bar{x}$ = 4.53; $\bar{x}$ = 4.30) and *student willingness to discuss content and exchange ideas* ($\bar{x}$ = 4.36; $\bar{x}$ = 4.20). The lowest mean rating ($\bar{x}$ = 4.10; $\bar{x}$ = 3.97) was given to the statement that *instructional technology is effective with virtually all students*. These ratings are up considerably in all areas from the 2000-2001 evaluation.

Table 1. Instructional Technology and Teaching
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question: Instructional Technology…	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
enables teachers to teach more effectively.	4.61	5	0.69	1	5	100
enables teachers to accommodate different learning styles.	4.63	5	0.58	3	5	99
enables teachers to be more creative.	4.60	5	0.64	3	5	99
increases student learning and comprehension.	4.52	5	0.71	3	5	98
increases student willingness to discuss content/exchange ideas.	4.36	5	0.75	3	5	99
increases student motivation and enthusiasm for learning.	4.56	5	0.68	3	5	97
is effective with virtually all types of students.	4.10	4	0.97	1	5	99

-Min. is minimum; Max is maximum.

Topic 2. Instructional Programming and Technology in the Classroom

Instructional Programming

Respondents were asked to respond to four statements about instructional technology programming intended for use in the classroom (table 2). Higher mean ratings were given to the statements that *schools have increasingly greater access to instructional technology programs* ($\bar{x}$ =4.14; $\bar{x}$ = 4.01) and that *the majority of these programs are of good quality* ($\bar{x}$ = 3.92; $\bar{x}$ = 3.68). Lower mean ratings were assigned to the statements that *the majority of the programs are <u>not</u> easily broken into "teachable" units* ($\bar{x}$ = 2.60; $\bar{x}$ = 2.74) and that *the majority of the programs are <u>not</u> appropriate (for example, too advanced or too basic) for their students* ($\bar{x}$ = 2.43; $\bar{x}$ = 2.64). These mean ratings are consistent with the other data collected through this evaluation, as both of these questions were posed in the negative as a check on respondents' attention and comprehension of each individual question. These results are consistent with one of the conclusions of the 2001 CEO Forum Report on school technology, which stated that for instructional technology to be positively received "[s]tate, district, and local policies, education programs, and resource allotment must be aligned in order to attain goals" (CEO Forum, 2001). Teachers are looking for more than the mere existence of instructional programming; they are looking for programming that is easily accessible and aligned with educational goals. These results are an improvement from last season's data.

Table 2. Instructional Programming
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question: Please indicate the extent to which you disagree or agree with the following statements about instructional programming.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
Increasingly, schools have greater access to instructional programs.	4.14	4	0.96	1	5	98
The majority of these programs are of good quality.	3.92	4	0.98	1	5	99
The majority of these programs are not appropriate (i.e., too advanced or too basic) for my students.	2.43	2	1.23	1	5	93
The majority of these programs are not easily broken into "teachable units."	2.60	2	1.14	1	5	89

-Min. is minimum; Max is maximum.

Instructional Technology

Respondents completing the survey reacted to three statements concerning the actual use of instructional technology in the classroom (table 3). They gave the highest mean rating ($\bar{x}$ = 4.04; $\bar{x}$ = 3.96) to the statements (1) that administrators *support and encourage teachers to use instructional technology in the classroom* and (2) that *classrooms are growing increasingly rich in instructional technology* ($\bar{x}$ = 3.94; $\bar{x}$ = 3.72). The lowest rating was given to the statement that *teachers are generally positive about introducing/using instructional technology in the classroom* ($\bar{x}$ = 3.39; $\bar{x}$ = 3.47).

Table 3. Instructional Technology
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question: Please indicate the extent to which you disagree or agree with the following statements about instructional technology.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
Administrators support and encourage teachers to use instructional technology in the classroom.	4.04	4	1.00	1	5	92
Classrooms are growing increasingly rich in instructional technology.	3.94	4	1.05	1	5	95
Teachers are generally positive about introducing/using instructional technology in the classroom.	3.39	3	1.06	1	5	97

-Min. is minimum; Max. is maximum.

Respondents were also given a list of seven factors that could prohibit or limit the integration of technology into their instructional programs. They were asked to indicate which of these factors they considered barriers to integrating technology into their instruction (fig. 1). Respondents were not limited to selecting one factor; they could select all factors that applied. They indicated that access to computers was the greatest barrier (64 percent), followed by lack of time in the schedule for technology projects (60 percent), not enough computer software (49 percent), lack of teacher training (44 percent), lack of knowledge about how to integrate technology into the curriculum (43 percent), and lack of technical support (36 percent). The failure of purchased software to be installed was reported as the factor least affecting the integration of technology in the classroom (10 percent).

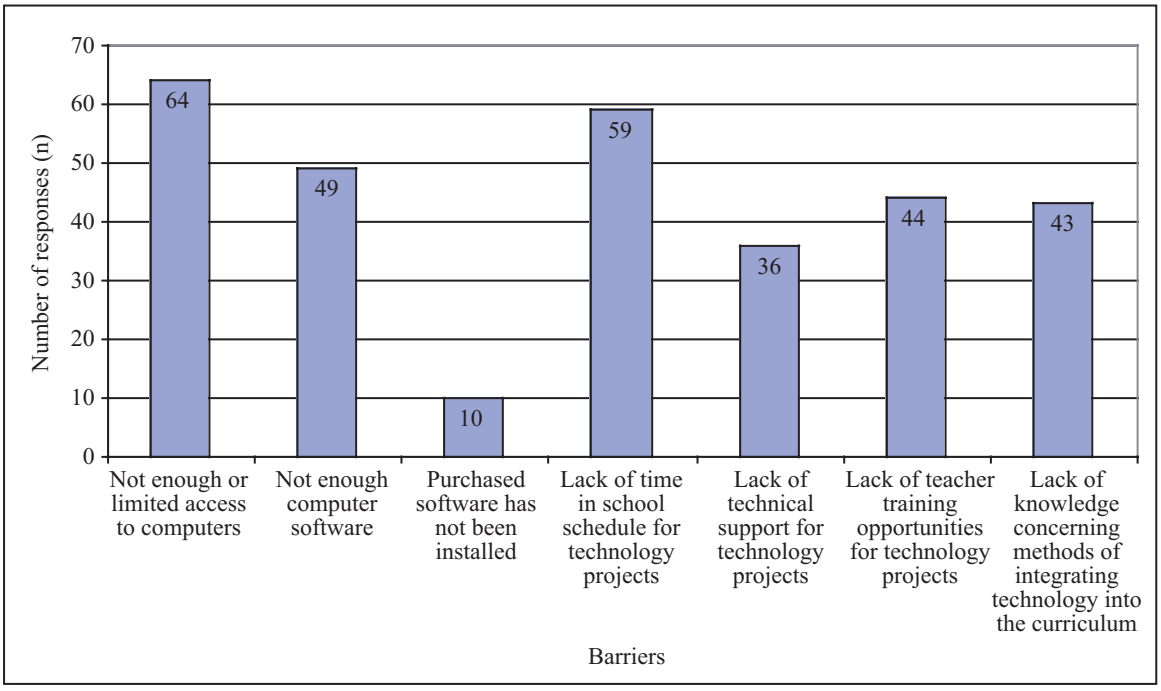

Figure 1. Survey question 15: Barriers to integrating technology into instructional program.

Topic 3. Overall Assessment of NASA "Why?" Files

We asked respondents to assess the four programs in the 2001-2002 "Why?" Files series (table 4). The highest mean ratings were given to the statement that *the content of the NASA "Why?" Files series was aligned with the national mathematics, science, and technology standards* ($\bar{x}$ = 4.71; $\bar{x}$ = 4.64) and to the statement that *the NASA "Why?" Files program presented mathematics, science, and technology as a process requiring creativity, critical thinking, and problem-solving skills* ($\bar{x}$ = 4.61; $\bar{x}$ = 4.63). High mean ratings were also given to the statement that *the programs presented women and minorities performing challenging engineering and science tasks* ($\bar{x}$ = 4.57; $\bar{x}$ = 4.53). Respondents agreed that the program content enhanced the teaching of mathematics, science, and technology ($\bar{x}$ = 4.54; $\bar{x}$ = 4.61). The lowest mean ratings were given to the statement that *program content was easily integrated into the curriculum* ($\bar{x}$ = 4.40; $\bar{x}$ = 4.40) and that *program content was developmentally appropriate for the grade level* ($\bar{x}$ = 4.34; $\bar{x}$ = 4.39).

Table 4. Overall Assessment of NASA "Why?" Files Program
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question: Please indicate the extent to which you disagree or agree with the following statements concerning the seven programs in the 2001-2002 NASA "Why?" Files series.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
The goals and objectives of the series were met.	4.53	5	0.60	3	5	74
The program content was developmentally appropriate for the grade level.	4.34	4.5	0.79	2	5	76
The program content was aligned with the national mathematics, science, and technology standards.	4.71	5	0.51	3	5	73
The program content was easily integrated into the curriculum.	4.40	5	0.79	2	5	75
The program content enhanced the teaching of mathematics, science, and technology.	4.54	5	0.66	3	5	76
The programs raised student awareness about careers that require mathematics, science, and technology on the job.	4.53	5	0.64	3	5	77
The programs presented the application of mathematics, science, and technology on the job.	4.53	5	0.64	2	5	77
The programs presented workplace mathematics, science, and technology as a collaborative process.	4.55	5	0.62	3	5	76

Table 4. Concluded

Question: Please indicate the extent to which you disagree or agree with the following statements concerning the seven programs in the 2001-2002 NASA "Why?" Files series.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
The program presented mathematics, science, and technology as a process requiring creativity, critical thinking, and problem-solving skills.	4.61	5	0.57	3	5	77
The programs presented women and minorities performing challenging engineering and science tasks.	4.57	5	0.58	3	5	70

-Min. is minimum; Max. is maximum.

Topic 4. Use of NASA "Why?" Files Video Programs

We asked respondents whether they used the four programs at the time they were received (fig. 2). The number of "yes" responses varied from 42 respondents for Program 4 to 21 respondents for Program 1. The number of "no" responses varied from 19 respondents for Program 1 to 8 respondents for Program 4. Overall, the number of respondents who indicated they "may use the program in the future" ranged from 43 respondents for Program 3 to 33 respondents for Program 2.

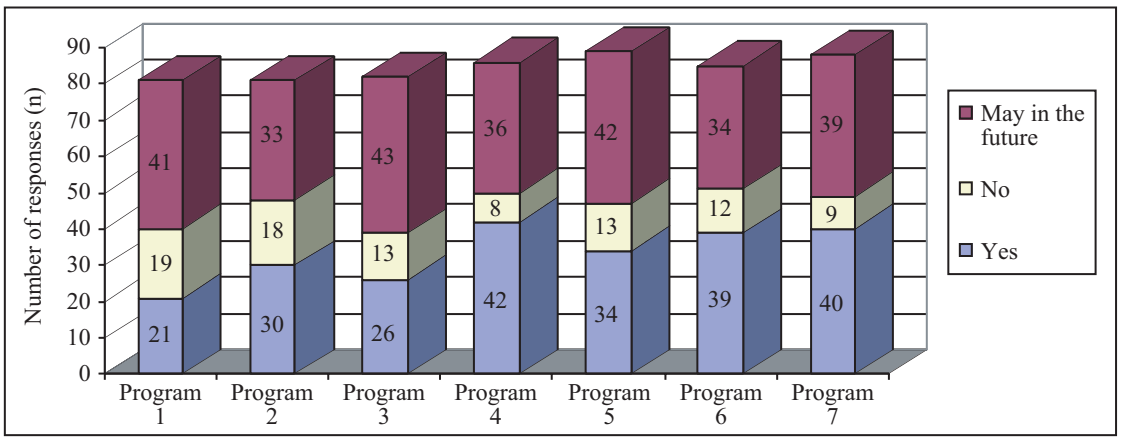

Figure 2. Survey question 2: Use of programs in NASA "Why?" Files series.

Respondents who used the NASA "Why?" Files programs were asked to identify how they used them in their classes (fig. 3). They were to choose from four possible uses for each of the four programs: (1) to introduce a curriculum topic, objective, or skill; (2) to reinforce a curriculum topic, objective, or skill; (3) as a special interest topic; (4) as a break from the classroom routine.

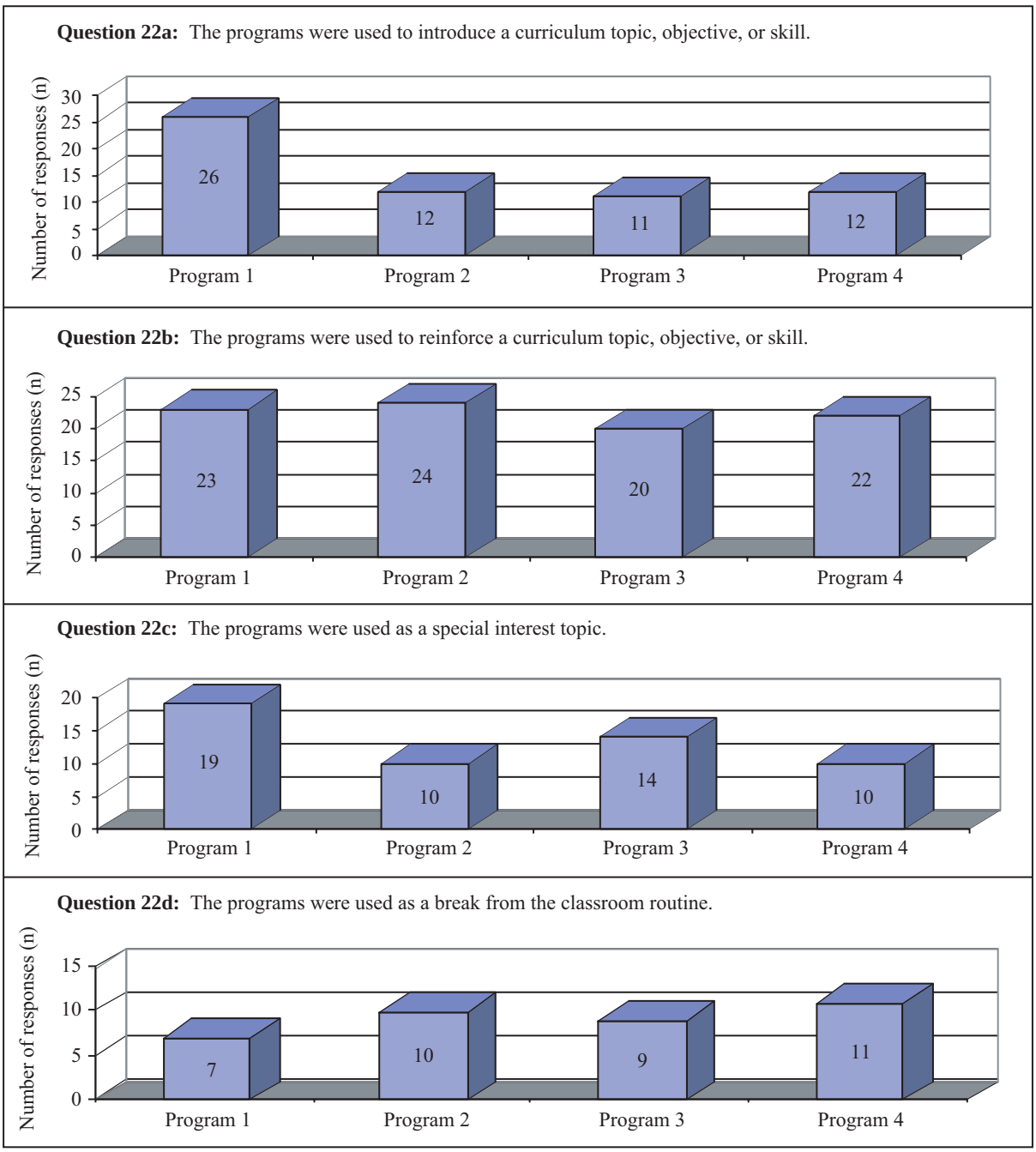

Figure 3. Survey question 22 (a–d): How NASA "Why?" Files programs are used in the classroom.

Program Delivery

We then asked respondents how they viewed each of the four programs. Options included live, taped, or via both methods (fig. 4).

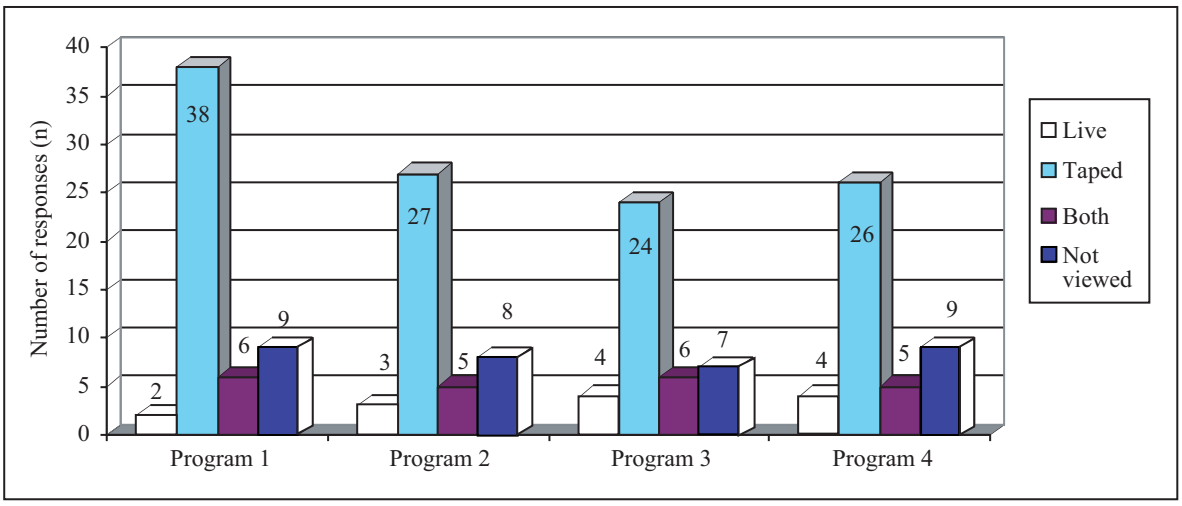

Figure 4. Survey question 23: How respondents viewed NASA "Why? Files programs.

Program Acquisition

Respondents who used the program were then asked to indicate the method by which they received the program.

- **22 respondents** indicated that the programs were **viewed on PBS.**
- **10 respondents** indicated that they had **downloaded** the programs.
- **24 respondents** indicated that a **Media Specialist had taped it** for later viewing.
- **14 respondents** indicated that **they, or someone else, had taped it** for later viewing.
- **14 respondents** indicated that **NASA had sent them copies** of programs.

Ease of Attainability

A follow-up question regarding receipt of the NASA "Why?" Files programs inquired whether respondents experienced any difficulty obtaining any of the programs in the 2001-2002 series. Of the 79 respondents who answered this question, 34 percent indicated they experienced difficulty obtaining the programs—down significantly from 55 percent during the 2000-2001 season.

Grades Viewing the NASA "Why?" Files Programs

Respondents who used the 2001-2002 NASA "Why?" Files were asked to report which grade levels viewed the programs (fig. 5).

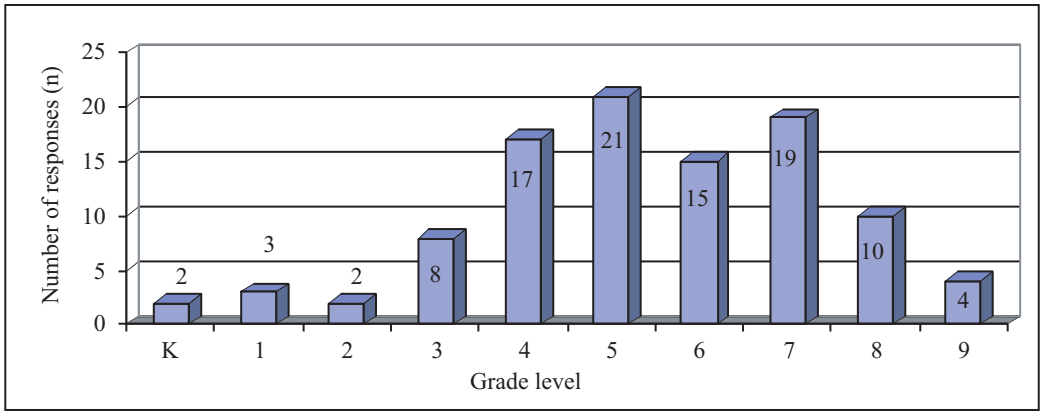

Figure 5. Survey question 26: Grade levels viewing NASA "Why?" Files programs.

Quality of the Television/Video Programs

The last component of the NASA "Why?" Files television/video program evaluation process asked respondents to evaluate program content and quality by indicating their level of agreement with fifteen statements (table 5). The statements that received the strongest support from respondents were these: *the programs enhanced the integration of mathematics, science, and technology in the classroom* ($\bar{x}$ = 4.69; $\bar{x}$ = 4.50), *the programs were of good technical quality* ($\bar{x}$ = 4.65; $\bar{x}$ = 4.68), and *the programs made learning science interesting* ($\bar{x}$ = 4.61; $\bar{x}$ = 4.69). High marks were also given to the statements that *the programs increased students' knowledge of science* ($\bar{x}$ = 4.59; $\bar{x}$ = 4.53), and *the programs were a valuable instructional aid* ($\bar{x}$ = 4.57; $\bar{x}$ = 4.44). The lowest scores were attributed to the these statements: *the programs increased student willingness to discuss/exchange ideas* ($\bar{x}$ = 4.30; $\bar{x}$ = 4.22), *the programs were easily incorporated into the curriculum* ($\bar{x}$ = 4.29; $\bar{x}$ = 4.26), and *the programs were effective with virtually all types of students* ($\bar{x}$ = 4.06; $\bar{x}$ = 3.91).

Table 5. Quality of the NASA "Why?" Files Television/Video Programs
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question: Please indicate the extent to which you disagree or agree with the following statements concerning the four programs in the 2001-2002 NASA "Why?" Files series.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
The programs were well organized.	4.54	5	0.60	3	5	72
The programs were of good technical quality.	4.65	5	0.51	3	5	71
The programs made "learning science" interesting.	4.61	5	0.55	3	5	69
The programs increased your students' knowledge of science.	4.59	5	0.55	3	5	68
The programs presented a "problem-based learning" environment.	4.56	5	0.56	3	5	68
The programs stressed the importance of information literacy skills.	4.46	5	0.63	3	5	68
The programs increased student willingness to discuss/exchange ideas.	4.30	4	0.72	2	5	67

Table 5. Concluded

Question: Please indicate the extent to which you disagree or agree with the following statements concerning the four programs in the 2001-2002 NASA "Why?" Files series.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
The programs increased student enthusiasm for learning.	4.35	4	0.64	3	5	68
The programs were effective with virtually all types of students.	4.06	4	0.70	2	5	65
The programs were a valuable instructional aid.	4.57	5	0.58	3	5	68
The programs were developmentally appropriate for the grade level.	4.50	5	0.65	3	5	70
The programs were easily incorporated into the curriculum.	4.29	4	0.79	2	5	69
The programs enhanced the integration of mathematics, science, and technology in the classroom.	4.69	5	0.50	3	5	68
The programs raised student awareness of careers that require mathematics, science, and technology.	4.44	5	0.66	3	5	68
The programs demonstrated the application of mathematics, science, and technology on the job.	4.52	5	0.63	3	5	69

-Min. is minimum; Max. is maximum.

Length of Program

Each program in the NASA "Why?" Files series is 60 minutes long. Respondents were asked to give their opinion as to the length of the 2001-2002 NASA "Why?" Files programs (fig. 6).

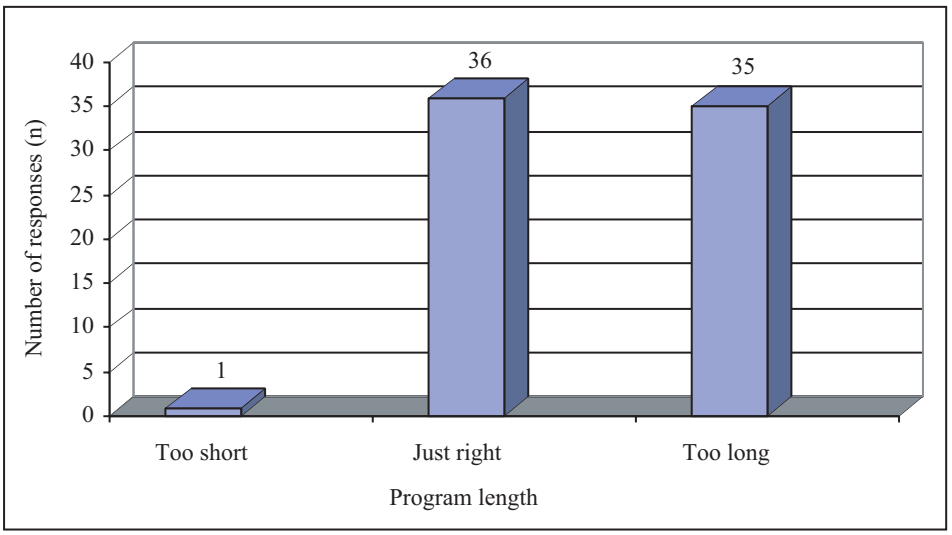

Figure 6. Survey question 46: Program length.

Topic 5. NASA "Why?" Files Lesson Guides

Use of Lesson Guide

We asked respondents whether they used the lesson guides as part of their registration with the NASA "Why?" Files series (fig. 7). The number of "yes" responses varied from 38 respondents for Program 4 to 22 respondents for Program 1. The number of "no" responses ranged from 6 respondents for Programs 6 and 7 to 14 respondents for Programs 1 and 2. Overall, the number of respondents indicating that they "may use the program in the future" ranged from 31 percent for Programs 3 and 5 to 24 respondents for Programs 2 and 4.

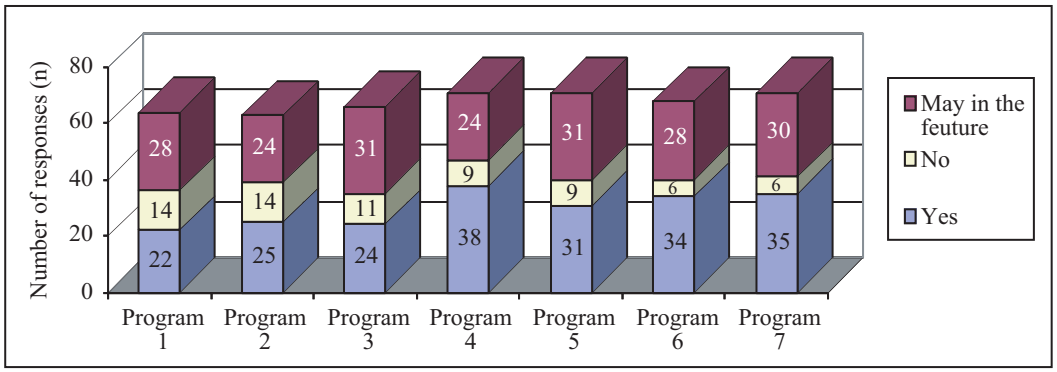

Figure 7. Survey question 47: Use of lesson guides.

Quality of Lesson Guides

The respondents were asked to react to seven statements about the quality of the NASA "Why?" Files lesson guides (table 6). Respondents indicated that *the lesson guides were a valuable instructional aid* and gave it the highest mean rating ($\bar{x}$ = 4.63; $\bar{x}$ = 4.57), followed by the statement that *the lesson guides correlated very well with the videos* ($\bar{x}$ = 4.57; $\bar{x}$ = 4.59). High scores were also given to the statements that *the activities and worksheets helped the students learn the "stated" learning objectives* ($\bar{x}$ = 4.55; $\bar{x}$ = 4.55), and *the layout of the lesson guides presented information clearly* ($\bar{x}$ = 4.56; $\bar{x}$ = 4.54). The statement that *the lesson guides were easily downloaded from the Internet* received the lowest mean rating ($\bar{x}$ = 4.21; $\bar{x}$ = 4.50). This result is a major decrease from last year, which is likely attributed to several weeks during which the web pages had to be taken off the web to heighten security following the terrorist attacks on September 11, 2001.

Table 6. Quality of the NASA "Why" Files Lesson Guides
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
The lesson guides correlated with the video.	4.57	5	0.59	3	5	60
The activities and worksheets helped students learn the "stated" learning objectives.	4.55	5	0.62	3	5	62

Table 6. Concluded

Question	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
The directions/instructions in the lesson guides were easily understood.	4.48	5	0.62	3	5	64
The layout of the lesson guides presented the information clearly.	4.56	5	0.64	2	5	63
The lesson guides were a valuable instructional aid.	4.63	5	0.52	3	5	63
The print and electronic resources in the lesson guides were valuable instructional aids.	4.46	5	0.72	2	5	61
The lesson guides were easy to download from the Internet.	4.21	4.5	0.95	2	5	42

-Min. is minimum; Max. is maximum.

Obtaining Lesson Guides

Respondents were asked whether they had difficulty obtaining any of the guides in the 2001-2002 NASA "Why?" Files series (fig. 8); 21 percent of respondents indicated that they had difficulty obtaining the guides. This response shows an increase from last year's finding of 10 percent. This increase can be attributed to web server problems directly related to a need for increased security following the events of September 11, 2001.

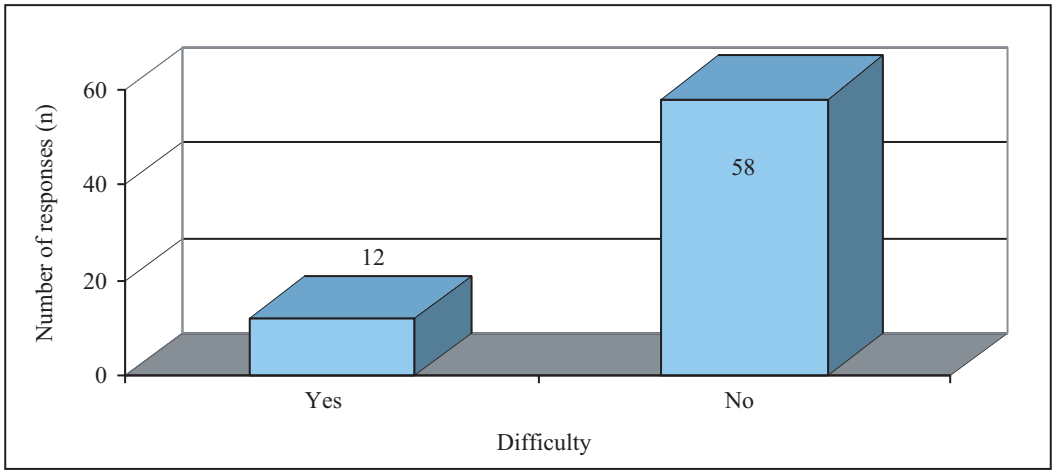

Figure 8. Survey question 56: Difficulty obtaining lesson guides.

Topic 6. Online Problem-Based Learning Activities

Respondents were asked about the online Problem-Based Learning (PBL) activities. PBL is used to introduce students to scientific inquiry and the scientific method. Respondents rated highest the statement that *the content of the PBL activities enhanced the integration of mathematics, science, and technology* ($\bar{x}$ = 4.44; $\bar{x}$ = 4.38) and rated lowest the statement that *the content of the PBL activities was easily integrated into the curriculum* ($\bar{x}$ = 4.27; $\bar{x}$ = 4.22).

Table 7. Online Problem-Based Learning Activities
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question: Please indicate the extent to which you disagree or agree with the following statements concerning the problem-based learning activity posted on the NASA "Why?" Files web site.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
The content of the PBL activities was easily integrated into the curriculum.	4.27	4	0.77	2	5	37
The content of the PBL activities enhanced the integration of mathematics, science, and technology.	4.44	4.5	0.61	3	5	34
The PBL activities raised student awareness of careers that require mathematical, scientific, and technological knowledge.	4.37	5	0.73	3	5	35

-Min. is minimum; Max. is maximum.

Grade Levels Using PBL Activities

Respondents who used the 2001-2002 NASA "Why?" Files program were asked to report which grade levels used the PBL activities (fig. 9). The largest percentage of students viewing the 2001-2002 NASA "Why?" Files series represented fifth graders (26/19 percent), followed by the fourth graders (19/14 percent).

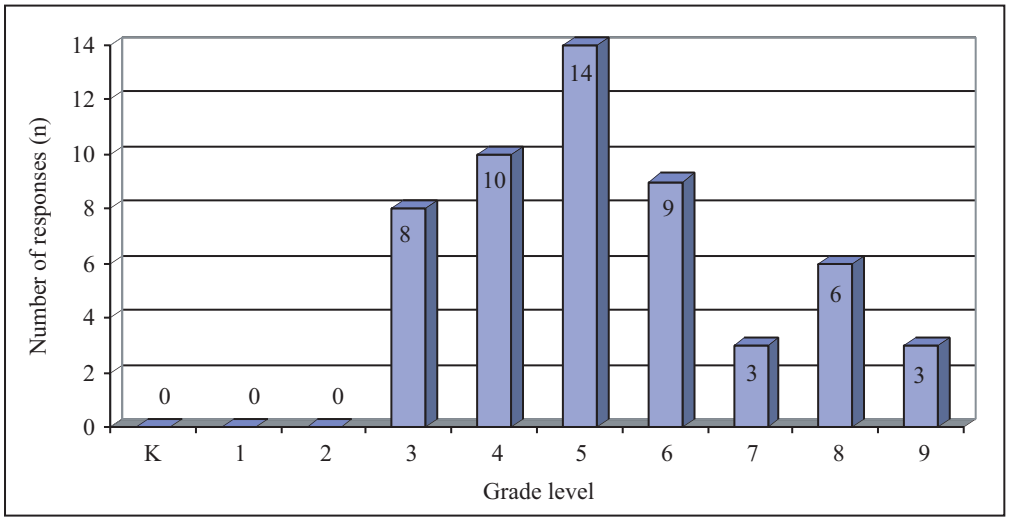

Figure 9. Survey question 64: Grade level(s) using PBL activities.

Respondents were asked to indicate the extent to which they agreed or disagreed with the following statements concerning the quality of the PBL activities posted on the NASA "Why?" Files web site (table 8). Respondents gave the highest mean rating to the statement that *the PBL activities enhanced the integration of mathematics, science, and technology* ($\bar{x}$ = 4.47; $\bar{x}$ = 4.35) as well as to the statements that *the PBL activities had a good balance of text and graphics* ($\bar{x}$ = 4.41; $\bar{x}$ = 4.38) and that *the PBL activities will likely be revisited/reused* ($\bar{x}$ = 4.41; $\bar{x}$ = 4.38). High scores were also given to the

statements that *the PBL activities allowed students to work at their own pace* ($\bar{x}$ = 4.30; $\bar{x}$ = 4.23), and that *the graphics for the PBL activities were appropriate for students* ($\bar{x}$ = 4.24; $\bar{x}$ = 4.32). Respondents gave the lowest mean rating to the statement that *students were able to complete the PBL activities in a reasonable amount of time* ($\bar{x}$ = 4.03; $\bar{x}$ = 4.04). It is, however, important to note that none of the questions regarding the PBL activities received a significant response rate; therefore, no significant conclusions or comparisons can be drawn from these data.

Table 8. Quality of PBL Activities
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question: Please indicate the extent to which you disagree or agree with the following statements concerning the problem-based learning activity posted on the NASA "Why?" Files web site.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
Students were able to complete the PBL activities in a reasonable amount of time.	4.03	4	1.00	1	5	32
The PBL activities accommodated various learning styles.	4.16	4	0.95	1	5	32
The content for the PBL activities was appropriate for my students.	4.06	4	1.06	1	5	33
The graphics for the PBL activities were appropriate for my students.	4.24	4	0.82	2	5	34
The PBL activities enhanced the integration of mathematics, science, and technology.	4.47	5	0.66	3	5	34
The PBL activities had a good balance of text and graphics.	4.41	5	0.82	2	5	34
The PBL activities allowed my students to work at their own pace.	4.30	4	0.85	2	5	33
The PBL activities will likely be revisited/reused.	4.41	5	0.76	3	5	32

-Min. is minimum; Max. is maximum.

Topic 7. NASA "Why?" Files Web Site

Respondents were asked to indicate the extent to which they agreed or disagreed with the following statements concerning the 2001-2002 NASA "Why?" Files web site (table 9). Respondents gave the highest mean ratings to the statements that *the NASA "Why?" Files web site has external links that provide opportunities for further exploration* ($\bar{x}$ = 4.61; $\bar{x}$ = 4.51), and *when viewed on a monitor, the web site is clearly legible* ($\bar{x}$ = 4.55; $\bar{x}$ = 4.60). High mean ratings were also given to the statements that *the NASA "Why?" Files web site is visually appealing* ($\bar{x}$ = 4.52; $\bar{x}$ = 4.67) and *the web site complements the broadcast/video* ($\bar{x}$ = 4.52; $\bar{x}$ = 4.53). Respondents gave the lowest mean rating in response to the statement that *pages within the web site download quickly* ($\bar{x}$ = 4.11; $\bar{x}$ = 4.18).

Table 9. Quality of Web Site
[A 1–5 point scale measures agreement; "5" indicates strongly agree.]

Question: Indicate the extent to which you agree/disagree with the following statements.	Mean	Median	Standard deviation	Min.	Max.	Number of responses (n)
The NASA "Why?" Files web site is visually appealing.	4.67	5	0.54	3	5	88
There is a good balance between text and graphics on the web site.	4.56	5	0.61	3	5	84
The web site is easily navigated.	4.49	5	0.68	3	5	87
When viewed on my monitor, the web site is clearly legible.	4.60	5	0.63	3	5	88
The web site is designed so that printouts of individual pages are legible.	4.53	5	0.68	3	5	78
Pages within the web site download quickly.	4.18	4	0.87	2	5	76
The page lengths are appropriate.	4.35	5	0.73	3	5	79
The links to other sites/pages are current.	4.47	5	0.72	3	5	79
The external links provide opportunities for further exploration.	4.51	5	0.62	3	5	78
The web site supports a PBL environment.	4.54	5	0.63	3	5	70
The web site complements the video.	4.53	5	0.70	3	5	68

-Min. is minimum; Max. is maximum.

Topic 8. Classroom Environment

Instructional Technology Equipment

Respondents were asked about the availability or location of specific kinds of technology in their classrooms, schools, and homes (figs. 10–16). Televisions, VCRs, video cameras, laser disc players, video editing equipment, computers, and DVDs were the items specified. We asked respondents to mark all that applied.

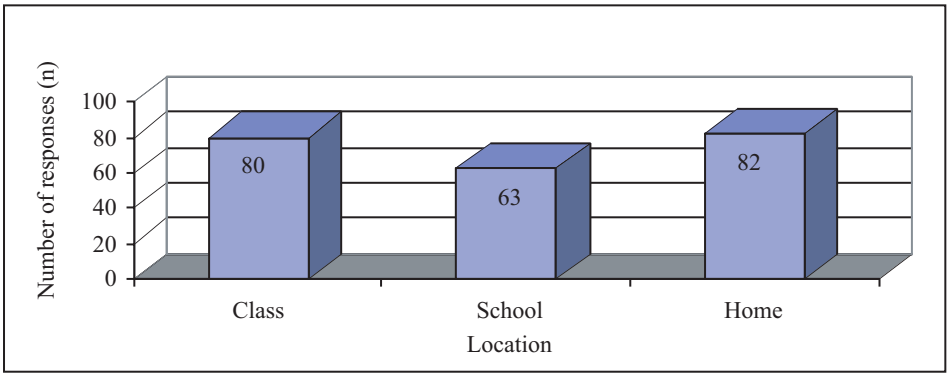

Figure 10. Survey question 99a: Availability of instructional technology equipment (TV).

Television

- **80 respondents** reported they had a television in their **classrooms**.
- **63 respondents** reported they had a television in their **schools.**
- **82 respondents** reported they had a television in their **homes**.

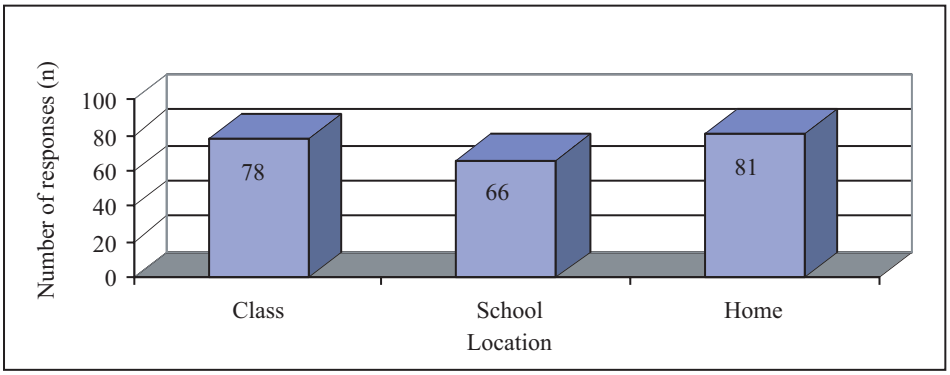

Figure 11. Survey question 99b: Availability of instructional technology equipment (VCR).

VCR

- **78 respondents** reported they had a VCR in their **classrooms**.
- **66 respondents** reported they had a VCR in their **schools.**
- **81 respondents** reported they had a VCR in their **homes.**

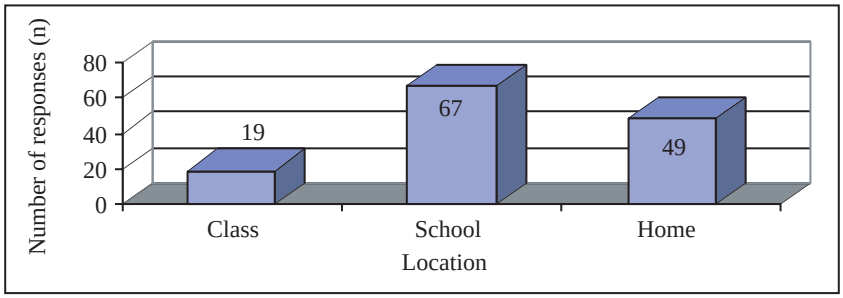

Figure 12. Survey question 99c: Availability of instructional technology equipment (video camera).

Video Camera

- **19 respondents** reported they had a video camera in their **classrooms.**
- **67 respondents** reported they had a video camera in their **schools.**
- **49 respondents** reported they had a video camera in their **homes.**

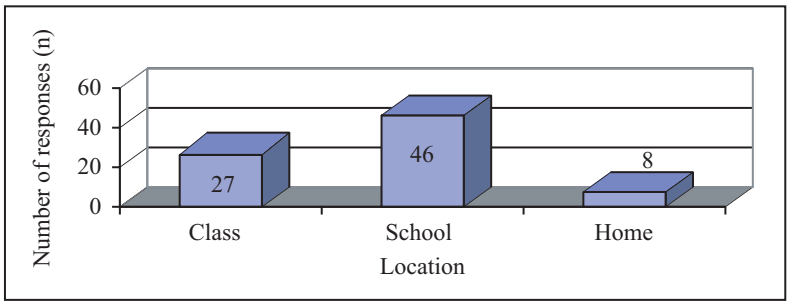

Figure 13. Survey question 99d: Availability of instructional technology equipment (laser disc player).

Laser Disc Player

- **27 respondents** reported they had a laser disc player in their **classrooms.**
- **46 respondents** reported they had a laser disc player in their **schools.**
- **8 respondents** reported they had a laser disc player in their **homes.**

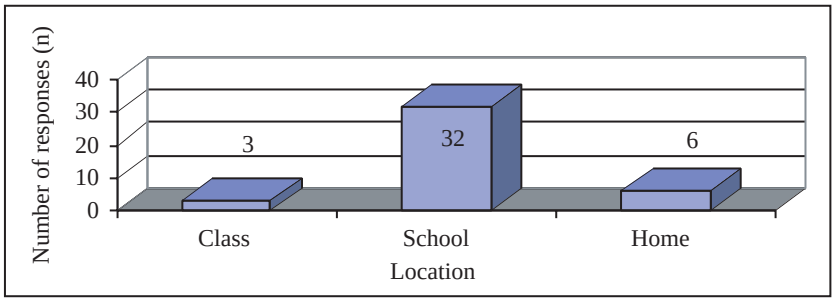

Figure 14. Survey question 99e: Availability of instructional technology equipment (video editing equipment).

Video Editing Equipment

- **3 respondents** reported they had video editing equipment in their **classrooms.**
- **32 respondents** reported they had video editing equipment in their **schools.**
- **6 respondents** reported they had video editing equipment in their **homes.**

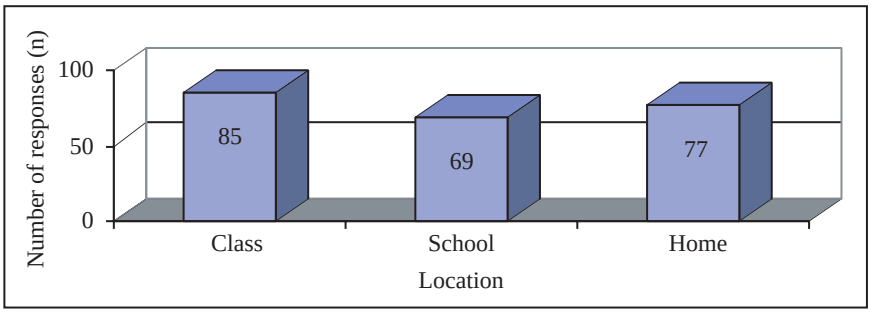

Figure 15. Survey question 99f: Availability of instructional technology equipment (computer).

Computer

- **85 respondents** reported they had a computer in their **classrooms.**
- **69 respondents** reported they had a computer in their **schools.**
- **77 respondents** reported they had a computer in their **homes.**

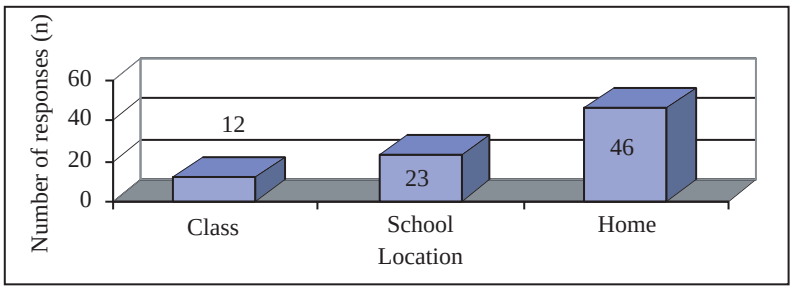

Figure 16. Survey question 99g: Availability of instructional technology equipment (DVD player).

DVD Player

- **12 respondents** reported they had a DVD player in their **classrooms.**
- **23 respondents** reported they had a DVD player in their **schools.**
- **46 respondents** reported they had a DVD player in their **homes.**

Computer Accessories

Respondents were asked about the availability or location of specific computer accessories (fig. 17). The accessories were a CD-ROM, a DVD, and an internet connection. The respondents were asked to mark all choices that applied.

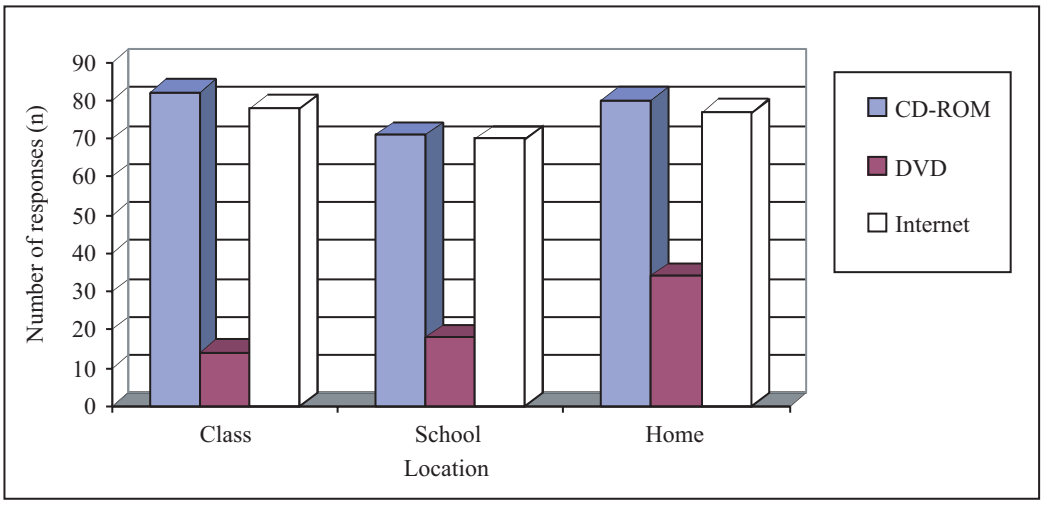

Figure 17. Survey question 100: Availability of specific computer accessories.

CD-ROM

- **82 respondents** reported they had a CD-ROM in their **classrooms.**
- **71 respondents** reported they had a CD-ROM in their **schools.**
- **80 respondents** reported they had a CD-ROM in their **homes.**

Internet

- **78 respondents** indicated they had internet access in their **classrooms.**
- **70 respondents** indicated they had internet access in their **schools.**
- **77 respondents** indicated they had internet access in their **homes.**

DVD

- **14 respondents** indicated they had a DVD player in their **classrooms.**
- **18 respondents** indicated they had a DVD player in their **schools.**
- **34 respondents** indicated they had a DVD player in their **homes.**

School Computer Operating System

Survey respondents were asked to enter a number for how many computers were in their classrooms. The mean number of computers in each classroom was 3.21. Survey respondents were then asked to identify the type of computer operating system used in their schools (fig. 18).

- **14 respondents** reported that they used **Macintosh** systems.
- **67 respondents** reported that they used **Windows** systems.
- **11 respondents** reported that they used both **Macintosh and Windows** systems.

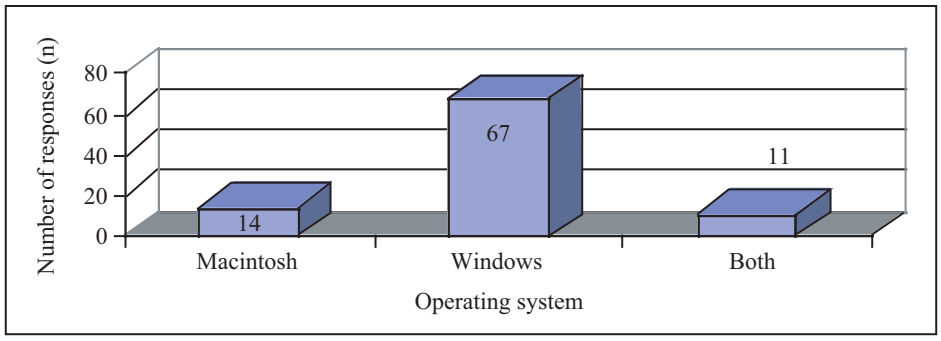

Figure 18. Survey question 102: Computer operating systems used in schools.

Student Use of School Computers

Respondents were asked how often a typical student in their schools used a computer during a given month (fig. 19).

- **19 respondents** indicated that students used the computers **1–5 times per month.**
- **19 respondents** indicated that students used the computers **6–10 times per month.**
- **16 respondents** indicated that students used the computers **11–20 times per month.**

- **27 respondents** indicated that students used the computers **21–40 times per month.**
- **6 respondents** indicated that students used the computers **over 40 times per month.**

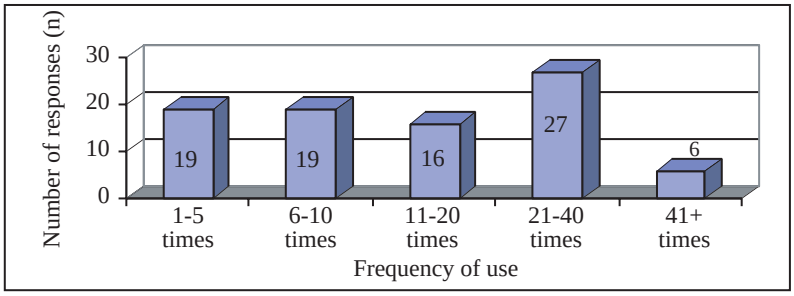

Figure 19. Survey question 103: Monthly student use of school computers.

Student-to-Computer Ratio

Survey respondents were asked how the students in their school operated computers in the classroom (fig. 20).

- **38 respondents** reported computer usage at a ratio of **1 student per computer**.
- **23 respondents** reported computer usage at a ratio of **2 students per computer**.
- **8 respondents** reported computer usage at a ratio of **3–5 students per computer**.
- **10 respondents** reported computers were generally **used as a class**.

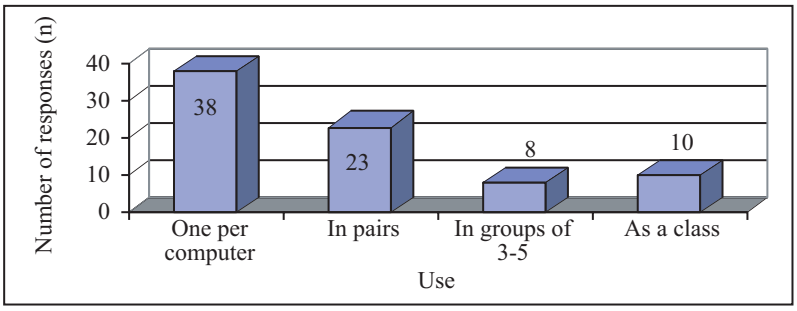

Figure 20. Survey question 104: Student computer use.

Classroom Connection to the Internet

Respondents were asked to indicate how the computers in their classrooms are connected to the Internet (fig. 21).

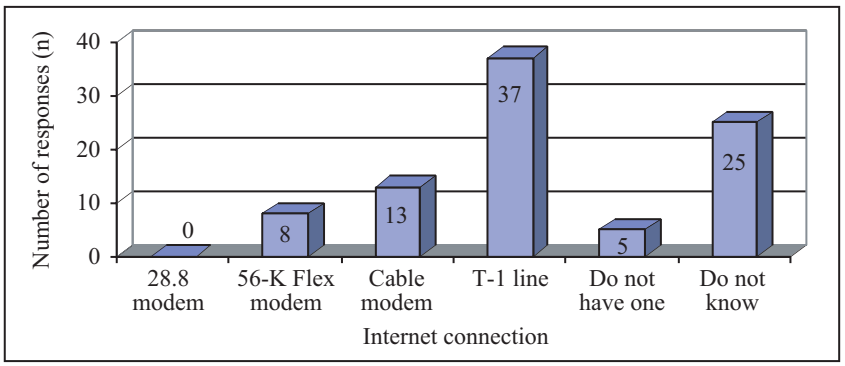

Figure 21. Survey question 105: Type of classroom internet connection.

- **0 respondents** reported using a **28.8-K Modem** to connect to the Internet.
- **8 respondents** reported using a **56-K Flex Modem** to connect to the Internet.
- **13 respondents** reported using a **Cable Modem** to connect to the Internet.
- **37 respondents** reported using a **T-1 Line** to connect to the Internet.
- **5 respondents** reported **not having an internet connection**.
- **25 respondents** reported **not knowing what type** of internet connection was in use.

Purposes of Student Computer Use

Survey respondents were given 11 purposes for student computer use and were asked to mark all that applied (fig. 22).

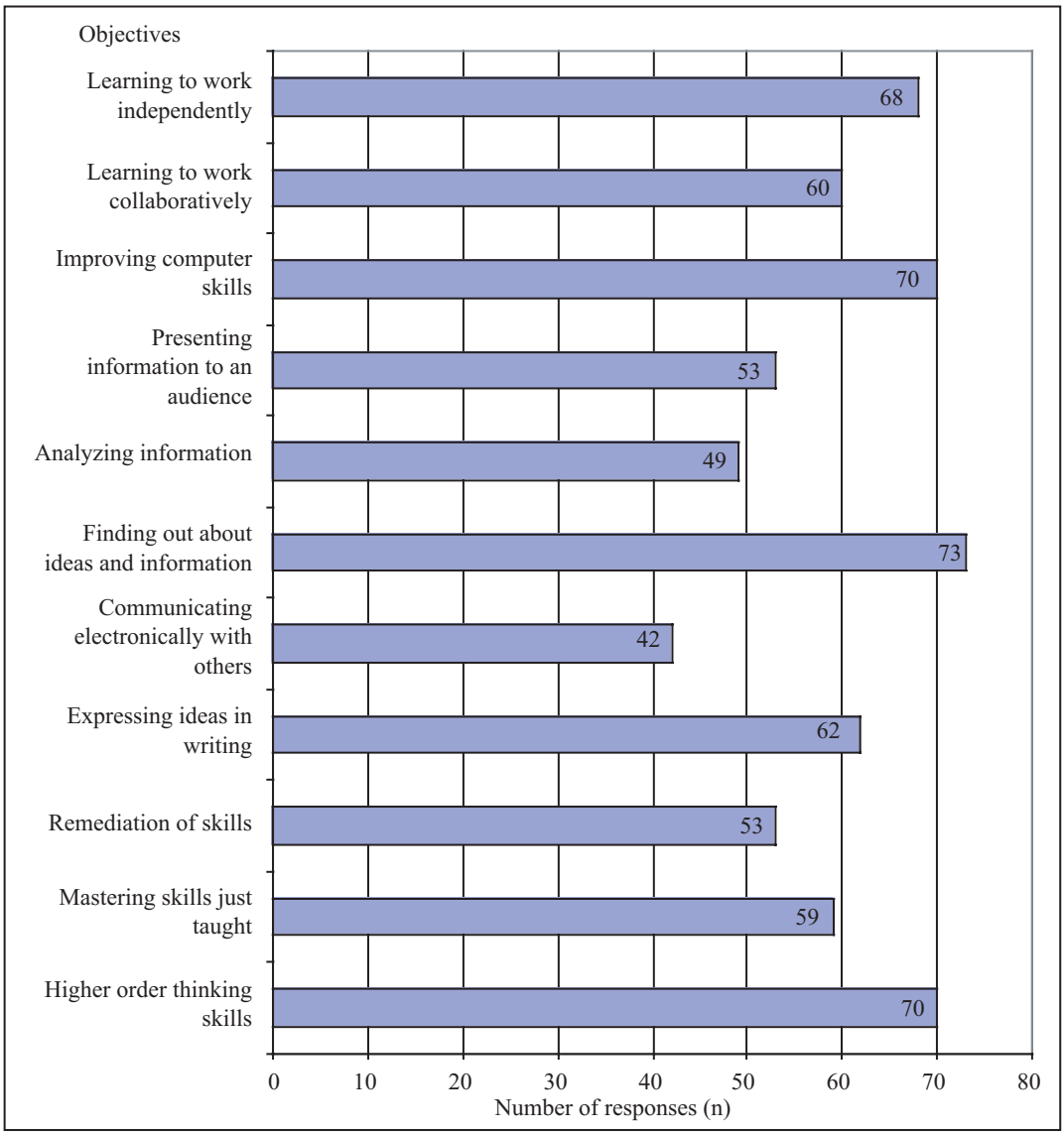

Figure 22. Survey question 107: Objectives for student computer use.

- **70 respondents** indicated computer use **for higher order thinking skills.**
- **59 respondents** indicated computer use **for mastering skills just taught.**
- **53 respondents** indicated computer use **for remediation of skills.**
- **62 respondents** indicated computer use **for expressing ideas in writing.**
- **42 respondents** indicated computer use **for communicating electronically with others.**
- **73 respondents** indicated computer use **for finding out about ideas and information.**
- **49 respondents** indicated computer use **for analyzing information.**
- **53 respondents** indicated computer use **for presenting information to an audience.**
- **70 respondents** indicated computer use **for improving computer skills.**
- **60 respondents** indicated computer use **for learning to work collaboratively.**
- **68 respondents** indicated computer use **for learning to work independently.**

Survey respondents were also given the opportunity to write in comments about their objectives for student computer use. Some examples of these comments are as follows:

- webbing, story mapping, and outlining
- testing
- using the computer as a tool for research and creativity

Use of Computers for Professional Activities

Educators were asked to identify the ways in which they used computers for lesson preparation or other professional activities and to indicate the frequency of each use (table 10). They were to mark all uses that applied.

Table 10. Computer Use

Question: Educators used their computers to…	Do not use	Occasionally	Weekly	More often
record/calculate student grades.	31	12	12	37
make handouts for students.	1	24	24	44
correspond with parents.	24	41	12	17
write lesson plans/related notes.	12	21	29	32
get information/pictures from the Internet for lessons.	6	31	29	26
use camcorders, digital cameras, or scanners.	32	38	12	11
exchange files with other teachers.	56	24	8	5
post student work, resource suggestions, or ideas and opinions on the World Wide Web.	56	24	5	8

Interpreting the Data

Having presented the survey findings in the previous section, the next step is to interpret them in terms of assessing the quality of the NASA "Why?" Files distance learning program. Excluding the survey demographics, interpretations of the findings are presented for each of the eight survey topics.

Topic 1. Instructional Technology and Teaching

Based on the data, it is apparent that those surveyed believe that instructional technology increases learning effectiveness and assists in accommodating the different learning styles of students. Those surveyed also believe that using instructional technology increases students' motivation and interest, resulting in increased comprehension and learning abilities. The findings in this area are considerably higher than those of last year, not to detract from the positive scores given during the 2000-2001 NASA "Why?" Files season.

Topic 2. Instructional Programming and Technology in the Classroom

Recent years have seen a significant increase in the availability and accessibility of instructional technology and programming. Respondents indicated that instructional programming is available and accessible. Respondents did indicate that the quality of instructional programming is higher than it was in the 2000-2001 evaluation. Despite the dramatic increased use of technology in schools, respondents report that computer availability is the greatest barrier to introducing technology in the classroom. Respondents reported that the regimented curriculum is the single largest barrier to using instructional programs in the classroom. As stated in a recent report by the Jason Project, "Caught on the horns of an assessment dilemma, [teachers] are increasingly held accountable for preparing their students to do well on the standardized achievement tests, but are expected at the same time to teach their students to think critically, explore deep content, and use technology to create project work. Most teachers are reluctant to spend a great deal of time on test preparation, recognizing that it impoverishes the curriculum, but feel they have little choice" (2002, p. 2). Although teachers are encouraged to use instructional programming, respondents reported the lack of time for computer projects to be the second greatest barrier to using instructional technology programming in the classroom. Note that mean values improved in all fields of this section.

Topic 3. Overall Assessment of the NASA "Why?" Files

The overall assessment of the NASA "Why?" Files series was very positive. The mean responses to questions regarding the overall assessment of the programs in the series were extremely high. We used a 5-point scale, with 5 being the highest value. All values assigned to the questions in this section were 4.39 and higher, resulting in an overall mean of 4.55. Respondents indicated that the content of the programs aligned with national mathematics, science, and technology standards, and that the programs demonstrated the importance of creativity, critical thinking, and problem-solving skills when addressing these disciplines. Respondents also reported that the programs presented workplace mathematics, science, and technology as a collaborative process, and that the programs raised student awareness about careers that require mathematics, science, and technology. These findings are comparable to those of the previous year's evaluation.

Topic 4. Use of NASA "Why?" Files Video Programs

NASA "Why?" Files is designed to enhance the instruction of mathematics, science, and technology in grades 3–5. Respondents reported a fairly even response to using the programs to introduce or reinforce a curriculum topic, objective, or skill, or as a special interest topic. Very few respondents indicated that they had viewed the programs live; rather, the overwhelming majority had taped them, had had someone else tape them, or had received copies from NASA for later use.

Two issues identified from the survey need to be addressed: (1) program acquisition and (2) program use. In terms of accessibility, the percentage of respondents indicating difficulty in receiving the programs dropped by over 20 percent. This result is incredibly positive and may reflect a degree of success with those efforts that were undertaken to reduce technical difficulties and technological barriers.

When asked for which grade levels the programs were being used, respondents indicated that the programs were being used mostly by fourth and fifth graders, but almost as frequently by sixth through eighth graders. Clearly, the programs in the series are being used in the grade levels intended by the NASA Center for Distance Learning and are also transcending the age barrier and providing quality educational programming for higher age groups. Perhaps this trend indicates a higher level of quality in the programs, and thus different benefits can be found which apply to multiple age groups.

The goals of the NASA "Why?" Files include (1) using Problem-Based Learning to introduce students to scientific inquiry and the scientific method, (2) providing students the opportunity to simultaneously learn subject matter and develop problem-solving skills while engaging in real world problems, and (3) demonstrating workplace mathematics, science, and technology as a collaborative process while raising students' awareness of careers and overcoming students' stereotyped beliefs by presenting women and minorities in challenging careers. These goals are supported by the findings of the Educational Research Service regarding Improving Student Achievement in Science. According to these findings, "Using real-life situations in science instruction through the use of technology (films, videotapes, videodiscs, CD-ROMS) or through actual observation increases student interest in science, problem-solving skills, and achievement" (Cawelti, 1999).

The responses to questions concerning the quality of the NASA "Why?" Files programs were very encouraging. The overall mean rating for this section was 4.42. The data suggest that the NASA "Why?" Files is meeting the (previously listed) goals of the series. Respondents indicated that the programs were technically sound, raised student awareness of and demonstrated application of mathematics, science, and technology in the work force, and managed to do so in an interesting manner.

Topic 5. NASA "Why?" Files Lesson Guides

More than half the respondents surveyed reported using the lesson guides. They reported that there was a good correlation between the lesson guides and the videos, and that the lesson guides were valuable instructional aids that help students learn the stated objectives. The lowest scoring question addressed the ease of downloading the lesson guides from the Internet, which may be accounted for in user error, as is evidenced through other inquiries in this evaluation. The overall mean for the lesson guides is 4.49.

Topic 6. Online Problem-Based Learning (PBL) Activities

"PBL is a method based on the principle of using problems as the starting point for the acquisition of new knowledge. Pivotal to its effectiveness is the use of problems that create learning through both new experience and the reinforcement of existing knowledge" (Lambros, 2002).

The NASA "Why?" Files uses Problem-Based Learning (PBL) to introduce students to scientific inquiry and to the scientific method. Each NASA "Why?" Files program allows students to define the problem, perform research and investigations, formulate a hypothesis, perform experiments, collect and analyze data, draw conclusions, and find solutions to the problem. Overall, the NASA "Why?" Files PBL activities received high ratings for both their quality and content. Moreover, respondents indicated that they were likely to revisit or reuse the PBL activities. Respondents who used the PBL activities indicated

that they were beneficial to the integration of mathematics, science, and technology and that they worked to increase awareness of careers that require knowledge of these disciplines. The survey indicated that fifth graders used the PBL activities the most, followed by fourth graders, and trailed closely by third and sixth graders. Most respondents indicated that the PBL activities were of high quality and were appropriate for the students who used them, giving the Online Problem Based Learning activities an overall mean rating of 4.26.

Topic 7. NASA "Why?" Files Web Site

Survey respondents were not given the opportunity to list whether, or how often, they used the web site, something that might be incorporated into future evaluation efforts. Responses to questions about the quality of the web site indicated that it was visually appealing and integrated a good balance of text and graphics. Respondents also reported that the web site complemented the NASA "Why?" File videos as well as the PBL environment. The survey indicated that faster downloads would improve the web site. The provider can help only so much with this type of technical problem because download speed is related to the user's internet connection speed. Using a 5-point scale (with 5 being the highest), respondents were asked to *rate* the quality of the NASA "Why?" Files web site. The *overall* mean quality rating for the NASA "Why?" Files web site was 4.45. Respondents agreed that the site was visually appealing, easily navigated, and that the links to other sites and pages are current.

Topic 8. Classroom Environment

Instructional Technology Equipment

Respondents were asked several questions regarding the availability of specific instructional technology equipment (e.g., VCRs, DVD players) in their classrooms, schools, and homes. The answers to these questions could be used to "paint a picture" of the existing technology landscape to help explain the "use/non-use" of existing technology-based products and to help plan the introduction of additional technology-based products as part of the NASA "Why?" Files series. Most respondents indicated the presence of a TV, VCR, and a computer in their classrooms, schools, and homes. The more expensive equipment (e.g., video editing system and digital camera) was found in schools and to a far lesser degree in classrooms and homes. Newer technology (e.g., a DVD player) was found in the home and to a lesser degree in schools and the classrooms. What these results don't tell us, however, is what access teachers have to this equipment; how much, if any, training educators have had using this equipment; how many computers educators may have in their classrooms; and the amount of time they have to use a computer or any other technology equipment during the school day.

Computer Accessories

Respondents were also asked about the availability of specific computer equipment and accessories in their classrooms, schools, and homes. Again, the answers to these questions could be used to "paint a picture" of the existing technology landscape, to help explain the "use/non-use" of existing technology-based products, and to help plan the introduction of additional technology-based products as part of the NASA "Why?" Files series. It is also very apparent that access to the Internet is increasing at an astounding rate in homes, schools, and classrooms. The school environment is facing globalization just as industrial and political environments are.

Student Use of Computers

The survey attempted to determine the number of computers in the classrooms and the type of operating system(s) used by these computers. The average number of computers per classroom was slightly less than seven, which is double the mean from the 2000-2001 evaluation. The increase in the number of computers per classroom is encouraging if computers are to truly have a beneficial impact on the educational experience. As stated by Laurence Goldberg, "By its very nature, technology lends itself to interactive, bi-directional activities; this is why the insertion of a few computers into the traditional educational model of frontal, unidirectional delivery of facts and instruction has largely not had any substantial effect on learning" (2002, p. 33). Therefore, more computers in the average classroom may lead to a more beneficial use of those computers, both in relation to the NASA "Why?" Files program and education as a whole.

In terms of type of computer operating systems, 67 respondents reported that their systems were PC operating systems, 14 respondents used Macintosh, while 11 respondents reportedly used both systems. We also wanted to know how often per month a typical student used a classroom computer. About 19 respondents indicated that students typically use a computer 1 to 5 times a month; another 19 respondents reported a usage rate of 6 to 10 times a month, while 16 respondents reported a usage rate of 11 to 20 times a month. Another 27 respondents reported 21 to 40 times a month, and 6 respondents indicated that students used the computers over 40 times per month. Respondents were asked to report the ratio of computers in their classroom to student use. About half the respondents reported general computer usage at a ratio of 1 student per computer. About one quarter of the respondents reported a ratio of 2 students per computer, and the remaining quarter of the respondents was split almost equally between 3 to 5 students per computer and the "other" option. Finally, we wanted to determine the purpose for which teachers and students use the computer. Of the 11 purposes given, the "top three" were "finding out about ideas and information," followed by "higher order thinking skills," and "improving computer skills." This finding is consistent with the top three uses indicated for teacher computer use in the 2000-2001 season.

Educators Professional Use of Computers

The training teachers and educators receive is essential to the successful deployment of technology in the classroom (Thomas, 2000). "Today's teachers are asked to integrate technology and to incorporate media into their classes to enhance teaching while improving student learning. Money is poured into schools to supply labs with state-of-the-art equipment and software. However, all the best intentions in the world are impossible to carry out if teachers are not trained sufficiently, are not comfortable with the software and equipment, and/or do not believe in the benefits of current technology" (Ariza, Knee, and Ridge, 2000). Acknowledging this reality, we asked respondents several questions about training and computer use.

Respondents were asked to rate the helpfulness of the school-based technology training provided by their school or school system. Most reported that the training was moderately helpful. We did not ask respondents, however, whether their school or school division offered school-based technology training. Respondents reported that they most often used a computer for such administrative duties as recording or calculating grades and for such educational purposes as making handouts for students, searching the Internet for lesson use, and preparing lesson plans. In a study conducted by the Center for Research on Information Technology and Organizations, identical findings were reported: "Overall, teachers' most frequent professional uses related to their day-to-day needs—making handouts, keeping records of student grades, and writing lesson plans or notes. Most teachers use computers to make handouts for class on at least a weekly basis. Almost half of all teachers use computers that frequently to record and calculate

student grades and to make lesson plans or notes" (Anderson and Ronnkvist, 1999, p. 31). Respondents reported that they least often used computers to operate technology-based equipment, to exchange files with other educators, and to post student work assignments on the World Wide Web.

Concluding Remarks

A self-reported mail survey was sent to individuals randomly selected from the database of NASA "Why?" Files registrants. Based on the responses, the following facts have been established for the 2001-2002 NASA "Why?" Files program year. This evaluation is unique in that it is the first of this series which is capable of being compared to previous seasons' data to further analyze the effectiveness of the NASA "Why?" Files series. Although there is agreement that schools have greater access to instructional programs and that these instructional programs are of good quality, survey respondents indicated that most of the programs are either too advanced or too basic and are not easily broken into teachable units. Survey respondents also indicated that while more instructional technology is entering the classroom, teachers are generally less positive about using it. The greatest barriers to integrating technology into the classroom are (1) not enough or limited access to computers and (2) lack of time in the school schedule for technology (computer)-based projects. The data appear to correlate with data obtained from several large-scale (national) instructional technology studies and indicate that the views held by respondents to this study regarding instructional technology are very similar to those held by their peers.

The NASA "Why?" Files is a research and standards-based annual series of 60-minute instructional programs for students in grades 3–5. Programs are designed to introduce students to NASA; to integrate mathematics, science, and technology through the use of Problem-Based Learning (PBL), scientific inquiry, and the scientific method; and to motivate students to become critical thinkers and active problem solvers. Overall, survey respondents (1) agree that the programs in the 2001-2002 series met their stated objectives; (2) that the length of the programs (60 minutes) was neither too long nor too short; and (3) that the programs are used most often to reinforce a topic, objective, or skill. Survey respondents reported that the lesson guides correlated well with the instructional broadcast, that they were a valuable aid, and that they were easy to download from the Internet. They also gave the Problem-Based Learning (PBL) activities and the NASA "Why?" Files web site high marks. It is unfortunate to note that due to uncontrollable tragic events (the September 11 terrorist attacks), we had to render the NASA "Why?" Files web page unavailable for several weeks during a period of high demand, thus skewing input on questions regarding the ease of downloading or accessing resources on the Internet. The positive result is that these pages are now up to date with the most recent standards of security and firewall protection available to us.

According to the survey results, those who participated in the survey consider the NASA "Why?" Files a beneficial (instructional) resource that enhances and enriches teaching and learning and use it in the manner that is consistent with a resource. For example, (1) the programs are used in grades 3–5; (2) the instructional broadcast is usually taped for use at a later date rather than being used live; (3) some parts of a NASA "Why?" Files program are used more often than others; and (4) as an instructional resource the NASA "Why?" Files is used most often to reinforce topics, objectives, or skills. Collectively, the data support the continued production of the series. However, during the course of the 2002-2003 season, it would be instructive to evaluate electronically each of the programs in the series. As part of conference attendance and especially as part of any conference presentation, it might be instructive to conduct interviews with educators as (1) a way of learning more about the suitability/usability of the NASA "Why?" Files and (2) as a means of identifying barriers that might prohibit or inhibit its use, such as "a fixed curriculum" or "the amount of time available to teach science." Lastly, it seems that increased use of the programs might result from greater explanation and demonstration of the NASA "Why?" Files. Therefore, participation in pre-service and in-service education workshops and as part of technology exhibits might result in increased program use.

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Appendix A

The NASA "Why?" Files

Evaluation Booklet

Evaluating the Effectiveness of the

2001-2002 NASA "Why?" Files Program Series

A research-based, Emmy award-winning, standards-based instructional distance learning program for grades 3-5 that introduces students to science as inquiry, the scientific method, and problem-based learning. The NASA "Why?" Files is produced by the NASA Langley Research Center, Hampton, VA.

Instructional Technology and Teaching

Please indicate (circle the number) the extent to which you disagree or agree with the following statements about instructional technology and classroom teaching.

Instructional technology . . .

1. enables teachers to teach more effectively.

Disagree				Agree	No Opinion
1	2	3	4	5	9

2. enables teachers to accommodate different learning styles.

Disagree				Agree	No Opinion
1	2	3	4	5	9

3. enables teachers to be more creative.

Disagree				Agree	No Opinion
1	2	3	4	5	9

4. increases student learning and comprehension.

Disagree				Agree	No Opinion
1	2	3	4	5	9

5. increases student willingness to discuss content/exchange ideas.

Disagree				Agree	No Opinion
1	2	3	4	5	9

6. increases student motivation and enthusiasm for learning.

Disagree				Agree	No Opinion
1	2	3	4	5	9

7. is effective with virtually all types of students.

Disagree				Agree	No Opinion
1	2	3	4	5	9

Instructional Programming and Technology in the Classroom

Please indicate the extent to which you disagree or agree with the following statements about instructional programming and technology.

8. Increasingly, schools have greater access to instructional programs.

Disagree				Agree	No Opinion
1	2	3	4	5	9

9. Most of these programs are of good quality.

Disagree				Agree	No Opinion
1	2	3	4	5	9

10. Most of these programs are **not** appropriate (i.e., too advanced or too basic) for my students.

Disagree				Agree	No Opinion
1	2	3	4	5	9

11. Most of these programs are **not** easily broken into "teachable" units.

Disagree				Agree	No Opinion
1	2	3	4	5	9

12. Administrators support and encourage teachers to use instructional technology in the classroom.

Disagree				Agree	No Opinion
1	2	3	4	5	9

13. Classrooms are growing increasingly rich in instructional technology.

Disagree				Agree	No Opinion
1	2	3	4	5	9

14. Teachers are generally positive about introducing/using instructional technology in the classroom.

Disagree				Agree	No Opinion
1	2	3	4	5	9

Instructional Programming and Technology in the Classroom

15. Which of the following factors are barriers to integrating technology into your instructional program? (Check all that apply.)

- ❑ Not enough or limited access to computers
- ❑ Not enough computer software
- ❑ Purchased software has not been installed
- ❑ Lack of time in school schedule for technology projects
- ❑ Lack of technical support for technology projects
- ❑ Lack of teacher training opportunities for technology projects
- ❑ Lack of knowledge concerning methods of integrating technology into the curriculum

16. Do you use instructional programming in your classroom?

- ❑ Yes
- ❑ No - **go to Q 21**

17. Compared to other instructional programming, the quality of the NASA "Why?" Files is

- ❑ Better than average
- ❑ About average
- ❑ Worse than average
- ❑ I'm unable to judge

18. Compared to the curriculum/teacher guides in other instructional programming, the quality of the NASA "Why?" Files curriculum/teacher guide is

- ❑ Better than average
- ❑ About average
- ❑ Worse than average
- ❑ I'm unable to judge

19. Compared to the video in other instructional programming, the quality of the video in the NASA "Why?" Files is

- ❑ Better than average
- ❑ About average
- ❑ Worse than average
- ❑ I'm unable to judge

20. Compared to the web-based activities in other instructional programming, the quality of the web-based activities in the NASA "Why?" Files is

- ❑ Better than average
- ❑ About average
- ❑ Worse than average
- ❑ I'm unable to judge

Television/Video Programs

The following questions pertain to the four programs in the 2001-2002 NASA "Why?" Files series.

21. Did you use the following programs? (Please check "✓.")

Program	Yes	No	No, but I may in the future
1. ...Red Light	❑	❑	❑
2. ...Dogs	❑	❑	❑
3. ..."Wright"...	❑	❑	❑
4. ...Electrical...	❑	❑	❑
5. ...Habitat	❑	❑	❑
6. ...Flight	❑	❑	❑
7. ...Weather	❑	❑	❑

22. If you selected "yes," please (✓)indicate how these programs were used.

	Program 1	2	3	4
a. To introduce a curriculum topic, objective, or skill	❑	❑	❑	❑
b. To reinforce a curriculum topic, objective, or skill	❑	❑	❑	❑
c. As a special interest topic	❑	❑	❑	❑
d. As a break from the classroom routine	❑	❑	❑	❑

23. If you selected "yes" for question 16, please indicate how these programs were viewed. (Please check "✓.")

	Program 1	2	3	4
a. Live	❑	❑	❑	❑
b. Taped	❑	❑	❑	❑
c. Both	❑	❑	❑	❑
d. Not viewed	❑	❑	❑	❑

24. How did you receive the program? (Please check "✓.")

	Yes	No
1. PBS	❑	❑
2. Downlinked it	❑	❑
3. Media Specialist taped it	❑	❑
4. I or someone else taped it	❑	❑
5. NASA sent me the tapes	❑	❑

6. Other (please specify)_____

Television/Video Programs, cont.

25. Did you experience difficulty obtaining any of the programs in the 2001-2002 NASA "Why?" Files series? (Please check "✓.")

    ❑ Yes ❑ No

26. If you selected "yes" for question 21, please indicate the grade level(s) that viewed the programs. (Please circle.)

    K 1 2 3 4 5 6 7 8 9

Please indicate the extent to which you disagree or agree with the following statements concerning the four programs in the 2001-2002 NASA "Why?" Files series.

27. The programs were well organized.

Disagree				Agree	No Opinion
1	2	3	4	5	9

28. The programs were of good technical quality.

Disagree				Agree	No Opinion
1	2	3	4	5	9

29. The programs made "learning science" interesting.

Disagree				Agree	No Opinion
1	2	3	4	5	9

30. The programs increased your students' knowledge of science.

Disagree				Agree	No Opinion
1	2	3	4	5	9

31. The programs presented a "problem-based learning" environment.

Disagree				Agree	No Opinion
1	2	3	4	5	9

32. The programs stressed the importance of information literacy skills.

Disagree				Agree	No Opinion
1	2	3	4	5	9

33. The programs increased student willingness to discuss/exchange ideas.

Disagree				Agree	No Opinion
1	2	3	4	5	9

Television/Video Programs, cont.

34. The programs increased student enthusiasm for learning.

Disagree				Agree	No Opinion
1	2	3	4	5	9

35. The programs were effective with virtually all types of students.

Disagree				Agree	No Opinion
1	2	3	4	5	9

36. The programs were a valuable instructional aid.

Disagree				Agree	No Opinion
1	2	3	4	5	9

37. The programs were developmentally appropriate for the grade level.

Disagree				Agree	No Opinion
1	2	3	4	5	9

38. The programs were easily incorporated into the curriculum.

Disagree				Agree	No Opinion
1	2	3	4	5	9

39. The programs enhanced the integration of mathematics, science, and technology in the classroom.

Disagree				Agree	No Opinion
1	2	3	4	5	9

40. The programs raised student awareness of careers that require mathematics, science, and technology.

Disagree				Agree	No Opinion
1	2	3	4	5	9

41. The programs demonstrated the application of mathematics, science, and technology on the job.

Disagree				Agree	No Opinion
1	2	3	4	5	9

42. The programs presented mathematics, science, and technology as disciplines requiring creativity, critical thinking, and problem-solving skills.

Disagree				Agree	No Opinion
1	2	3	4	5	9

Television/Video Programs, concl.

43. The programs stressed the importance of information technology skills.

Disagree				Agree	No Opinion
1	2	3	4	5	9

44. The programs presented women and minorities performing challenging engineering and scientific tasks.

Disagree				Agree	No Opinion
1	2	3	4	5	9

45. The programs were a positive link between the lesson guide and the web site.

Disagree				Agree	No Opinion
1	2	3	4	5	9

46. The length of the program (60 minutes) is? (Please check "✓.")

- ❑ too short
- ❑ just right
- ❑ too long

Lesson Guides

47. Did you use the lesson guides for the following programs? (Please check "✓.")

Program	Yes	No	No, but I may in the future
1. ...Red Light	❑	❑	❑
2. ...Dogs	❑	❑	❑
3. ..."Wright"...	❑	❑	❑
4. ...Electrical...	❑	❑	❑
5. ...Habitat	❑	❑	❑
6. ...Flight	❑	❑	❑
7. ...Weather	❑	❑	❑

8. Guides not received or not received in time ❑

48. If no, please explain and **then proceed to question #59:**

_____

_____

_____

_____

Please indicate the extent to which you disagree or agree with the following statements concerning the printed lesson guides used for the four programs in the 2001-2002 NASA "Why?" Files series.

49. The lesson guides correlated with the video.

Disagree				Agree	No Opinion
1	2	3	4	5	9

50. The activities and worksheets helped your students learn the "stated" learning objectives.

Disagree				Agree	No Opinion
1	2	3	4	5	9

51. The directions/instructions in the lesson guides were easily understood.

Disagree				Agree	No Opinion
1	2	3	4	5	9

52. The layout of the lesson guides presented the information clearly.

Disagree				Agree	No Opinion
1	2	3	4	5	9

53. The lesson guides were a valuable instructional aid.

Disagree				Agree	No Opinion
1	2	3	4	5	9

Lesson Guides, cont.

54. The print and electronic resources in the lesson guides were a valuable instructional aid.

Disagree				Agree	No Opinion
1	2	3	4	5	9

55. The lesson guides were easy to download from the Internet.

Disagree				Agree	Did Not Download
1	2	3	4	5	9

56. Did you experience difficulty obtaining any of the guides in the 2001-2002 NASA "Why?" Files series? (Please check "✓.")

❑ Yes ❑ No

57. If the lesson guides were only available in electronic format,

		Yes	No
could you use them on	CD-ROM	❑	❑
	DVD	❑	❑
would you use them on	CD-ROM	❑	❑
	DVD	❑	❑

58. Please add any other comments you have concerning the lesson guides:

59. Did you use the PBL activity for the following programs? (Please check "✓.")

Program	Yes	No	No, but I may in the future
1. ...Red Light	❑	❑	❑
2. ...Dogs	❑	❑	❑
3. ..."Wright"...	❑	❑	❑
4. ...Electrical...	❑	❑	❑
5. ...Habitat	❑	❑	❑
6. ...Flight	❑	❑	❑
7. ...Weather	❑	❑	❑

60. If no, please explain and then proceed to question #74.

_____

_____

Please indicate the extent to which you disagree or agree with the following statements concerning the problem-based learning (PBL) activity posted on the NASA "Why?" Files web site.

61. The content of the PBL activities was easily integrated into the curriculum.

Disagree				Agree	No Opinion
1	2	3	4	5	9

62. The content of the PBL activities enhanced the integration of mathematics, science, and technology.

Disagree				Agree	No Opinion
1	2	3	4	5	9

63. The PBL activities raised student awareness of careers that require mathematical, scientific, and technological knowledge.

Disagree				Agree	No Opinion
1	2	3	4	5	9

64. If you selected "yes" for question 59, please indicate the grade level(s) that used the PBL activity. (Please circle.)

K 1 2 3 4 5 6 7 8 9

65. Students were able to complete the PBL activities in a reasonable amount of time.

Disagree				Agree	No Opinion
1	2	3	4	5	9

Online Problem-Based Learning Activity, cont.

66. The PBL activities accommodated various learning styles.

Disagree				Agree	No Opinion
1	2	3	4	5	9

67. The content for the PBL activities was appropriate for my students.

Disagree				Agree	No Opinion
1	2	3	4	5	9

68. The graphics for the PBL activities were appropriate for my students.

Disagree				Agree	No Opinion
1	2	3	4	5	9

69. The PBL activities enhanced the integration of mathematics, science, and technology.

Disagree				Agree	No Opinion
1	2	3	4	5	9

70. The PBL activities had a good balance of text and graphics.

Disagree				Agree	No Opinion
1	2	3	4	5	9

71. The PBL activities allowed my students to work at their own pace.

Disagree				Agree	No Opinion
1	2	3	4	5	9

72. The PBL activities will likely be revisited/reused.

Disagree				Agree	No Opinion
1	2	3	4	5	9

73. Please add any other comments you have concerning the PBL activity:

_____

_____

_____

_____

_____

_____

_____

_____

NASA "Why?" Files Web Site

The following questions pertain to the web site for the 2001-2002 NASA "Why?" Files series. Please indicate the extent to which you disagree or agree with the following statements.

74. The NASA "Why?" Files web site is visually appealing.

Disagree				Agree	No Opinion
1	2	3	4	5	9

75. There is a good balance between text and graphics on the web site.

Disagree				Agree	No Opinion
1	2	3	4	5	9

76. The web site is easily navigated.

Disagree				Agree	No Opinion
1	2	3	4	5	9

77. When viewed on my monitor, the web site is clearly legible.

Disagree				Agree	No Opinion
1	2	3	4	5	9

78. The web site is designed so that printouts of individual pages are legible.

Disagree				Agree	No Opinion
1	2	3	4	5	9

79. Pages within the web site download quickly.

Disagree				Agree	No Opinion
1	2	3	4	5	9

80. The page lengths are appropriate.

Disagree				Agree	No Opinion
1	2	3	4	5	9

81. The links to other sites/pages are current.

Disagree				Agree	No Opinion
1	2	3	4	5	9

82. The external links provide opportunities for further exploration.

Disagree				Agree	No Opinion
1	2	3	4	5	9

83. The web site supports a PBL environment.

Disagree				Agree	No Opinion
1	2	3	4	5	9

NASA "Why?" Files Web Site, concl.

84. The web site complements the broadcast/video.

Disagree				Agree	No Opinion
1	2	3	4	5	9

85. Please add any other comments you have concerning the NASA "Why?" Files web site.

Overall Assessment

Please indicate the extent to which you disagree or agree with the following statements concerning the seven programs in the 2001-2002 NASA "Why?" Files series.

86. The goals and objectives of the series were met.

Disagree				Agree	No Opinion
1	2	3	4	5	9

87. The program content was developmentally appropriate for the grade level.

Disagree				Agree	No Opinion
1	2	3	4	5	9

88. The program content was aligned with the national mathematics, science, and technology standards.

Disagree				Agree	No Opinion
1	2	3	4	5	9

89. The program content was easily integrated into the curriculum.

Disagree				Agree	No Opinion
1	2	3	4	5	9

90. The program content enhanced the teaching of mathematics, science, and technology.

Disagree				Agree	No Opinion
1	2	3	4	5	9

91. The programs raised student awareness about careers that require mathematics, science, and technology.

Disagree				Agree	No Opinion
1	2	3	4	5	9

92. The programs presented the application of mathematics, science, and technology on the job.

Disagree				Agree	No Opinion
1	2	3	4	5	9

93. The programs presented workplace mathematics, science, and technology as a collaborative process.

Disagree				Agree	No Opinion
1	2	3	4	5	9

Overall Assessment, concl.

94. The programs presented mathematics, science, and technology as a process requiring creativity, critical thinking, and problem-solving skills.

Disagree				Agree	No Opinion
1	2	3	4	5	9

95. The programs presented women and minorities performing challenging engineering and science tasks.

Disagree				Agree	No Opinion
1	2	3	4	5	9

96. Have you recommended the NASA "Why?" Files to a colleague?
❑ Yes ❑ No

97. One of the goals of NASA is to educate and inform others about what NASA does. Do you think the NASA "Why?" Files has been successful in this regard?
❑ Yes ❑ No

98. In your opinion is the information about NASA contained in the NASA "Why?" Files
❑ Very credible
❑ Somewhat credible
❑ Not credible
❑ I'm not able to judge

Computers and Associated Technology

The following questions pertain to your classroom, your school, and your home.

99. Do you have the following equipment? (Please check all that apply.)

	classroom	school	home
Television	❑	❑	❑
VCR	❑	❑	❑
Video camera	❑	❑	❑
Laserdisc player	❑	❑	❑
Video editing equipment	❑	❑	❑
Computer	❑	❑	❑
DVD	❑	❑	❑

100. Does your computer have the following? (Please check all that apply.)

	classroom	school	home
CD-ROM	❑	❑	❑
DVD	❑	❑	❑
Internet connection	❑	❑	❑

101. How many computers are in your classroom? (Please enter a number below.)

___(if "0", proceed to question #108)

102. The operating system used on your classroom computers is
❑ Macintosh ❑ Windows ❑ Both ❑ Other_____

103. In a given month, about how many times does a typical student use a computer in your classroom? (Please check.)
❑ 1-5 times ❑ 6-10 times ❑ 11-20 times
❑ 21-40 times ❑ 41+ times

104. Generally speaking, how do the students operate the computers in your classroom? (Please check.)
❑ one student per computer
❑ in pairs (2)
❑ in groups of 3 - 5
❑ as a class
❑ other_____

Computers and Associated Technology, cont.

105. My classroom connection to the Internet uses a _____ . (Please check.)

- ❑ 28.8 modem
- ❑ 56-K flex modem
- ❑ cable modem
- ❑ T-1 line
- ❑ do not have one
- ❑ do not know

106. The school-based technology training provided by my school division improved my computer technology skills.

Disagree			Agree		No Opinion	No school-based training provided
1	2	3	4	5	7	9

107. Which of the following are among the objectives you have for student computer use? (Please check all that apply.)

- ❑ Higher order thinking skills
- ❑ Mastering skills just taught
- ❑ Remediation of skills
- ❑ Expressing ideas in writing
- ❑ Communicating electronically with others
- ❑ Finding out about ideas and information
- ❑ Analyzing information
- ❑ Presenting information to an audience
- ❑ Improving computer skills
- ❑ Learning to work collaboratively
- ❑ Learning to work independently
- ❑ Other (describe)_____

_____

108. In which of these ways do you use computers to prepare lessons or in other professional activities? (Please check.)

a. To record or calculate student grades

- ❑ do not use
- ❑ occasionally
- ❑ weekly
- ❑ more often

b. To make handouts for students

- ❑ do not use
- ❑ occasionally
- ❑ weekly
- ❑ more often

Computers and Associated Technology, concl.

c. To correspond with parents

- ❑ do not use
- ❑ occasionally
- ❑ weekly
- ❑ more often

d. To write lesson plans or related notes

- ❑ do not use
- ❑ occasionally
- ❑ weekly
- ❑ more often

e. To get information or pictures from the Internet for use in lessons

- ❑ do not use
- ❑ occasionally
- ❑ weekly
- ❑ more often

f. To use camcorders, digital cameras, or scanners to prepare for class

- ❑ do not use
- ❑ occasionally
- ❑ weekly
- ❑ more often

g. To exchange computer files with other teachers

- ❑ do not use
- ❑ occasionally
- ❑ weekly
- ❑ more often

h. To post student work, suggestions for resources, or ideas and opinions on the World Wide Web

- ❑ do not use
- ❑ occasionally
- ❑ weekly
- ❑ more often

Demographics

These questions will be used to determine whether survey respondents with different backgrounds and characteristics have different opinions regarding instructional technology and NASA "Why?" Files. (Please check the appropriate response.)

109. Gender?

❑ Female ❑ Male

110. Present professional duties?
(Please check all that apply.)

❑ Teacher
❑ Home Schooler
❑ Technology Program Coordinator
❑ Principal
❑ Math Coordinator
❑ Science Coordinator
❑ Librarian/Media Specialist
❑ Community College Instructor
❑ College/University Instructor
❑ Distance Learning Coordinator
❑ Curriculum Coordinator
❑ Pre-Service Teacher
❑ Pre-Service Educator
❑ Other (please specify)_____

111. School type? (Please check only one.)

❑ College/University
❑ Community College
❑ Home School
❑ Native American School
❑ Private/Parochial
❑ Public

112. School location? (Please check only one.)

❑ Rural
❑ Suburban
❑ Urban

113. Highest degree?

❑ High School Diploma/Equivalency
❑ Associates (2-year)
❑ Baccalaureate (BA/BS)
❑ Master's/Master's Equivalency
❑ Education Specialist
❑ Doctorate

Demographics

114. Ethnicity? (Please check only one.)

- ❑ African American
- ❑ Asian
- ❑ Caucasian
- ❑ Hispanic
- ❑ Native American
- ❑ Pacific Islander
- ❑ Other (please specify)_____

115. How many years have you been a professional educator? (Please enter number below.)

_____

116. Your age? (Please enter number below.)

_____

117. Do you own a personal computer?

❑ Yes ❑ No

118. Are you a member of a professional (national) education organization (e.g., NESPA, NMSA, NCTM, NSTA)?

❑ Yes ❑ No

Thank you for your assistance.

In appreciation for having assisted us, we are pleased to offer you a copy of the 2001-2002 NASA "Why?" Files assessment report. To receive your free copy of the assessment report, please check the box to the right. ❑

With your assistance, the NASA Langley Research Center is providing the educational community with quality instructional distance learning programming for grades 3-5.

Please return to
NASA "Why?" Files
Mail Stop 400 - DL
NASA Langley Research Center
Hampton, VA 23681-2199

Appendix B. Comments Returned With Blank Evaluation Booklets

Serial number	**Inappropriate:** If recipients of the 2001-2002 NASA "Why?" Files evaluation booklet were unable to adequately assess the program and its components (i.e., they were not able to fit the program into the curriculum), they were asked to write the word "inappropriate" on the front of the booklet. The following are additional comments respondents included.
117	Inappropriate
222	Inappropriate. Just recently got the satellite working and it was removed. Didn't get to record anything. Sorry hopefully next year.
2	Inappropriate. Never saw the presentations.
922	Inappropriate. We did not use the program. Thanks.
835	Inappropriate
612	Inappropriate. Not at our school.
918	Inappropriate. I'm sorry but I didn't do the "Why?" Files with my class.
98	Inappropriate
576	Inappropriate. I have never been able to access the program. I have no satellite hook-up or digital cable.
72	Inappropriate
839	Inappropriate
460	Inappropriate
629	Inappropriate
165	Inappropriate
11	Inappropriate
259	Inappropriate. I'm not using the series but pass the info on to our 5th and 4th grade teachers.
180	Inappropriate
485	Inappropriate. By the time I got the schedule the dates were past. Thanks
134	Inappropriate. Thank you, but this survey is too long for me to complete.
669	Inappropriate.
68	Inappropriate. I am the "techie" that records, not the teacher who uses. Thanks.
859	Inappropriate.
135	Inappropriate.
120	Inappropriate. Did not use this year.
516	Inappropriate
753	Inappropriate
281	Inappropriate
647	Inappropriate. Dr. Pinelli: I am unable to complete the survey booklet evaluating the 2001-2002 NASA "Why?" Files Program. This letter requesting the program evaluation is the first correspondence received from this program during the 2001-2002 school year. I did not receive any materials sent throughout the school year. This may be due in part to a change in my teaching assignment. I am no longer at the Middle School but teach 9th Grade Earth Science. It should be noted that during the 2000-2001 school year, parts of the "Why?" Files were received throughout the year but no introduction was received. It was obvious that components were missing, as the numbered units were not continuous. I wish that I could help you more regarding this program. Without a doubt this would be a program that could enhance our current delivery of science instruction.
752	Inappropriate. I cannot complete this evaluation. Thank you. However, I teach 6-9 and will incorporate modifications of your programs in the school year 2002-2003.
570	Inappropriate. I cannot answer these questions because I did not use the materials this year.
785	Inappropriate - due to other curriculum matters, I was unable to use your program - I hope to do so in a future year. Thank you.
182	Inappropriate. I did not use the series this year. Sorry.
799	Inappropriate. The materials sent were not age appropriate for my Physics class. However my wife teaches at a grade school where they were able to use the material.

Appendix C. Solicited Comments to Qualitative Questions

Serial number	**Question 24:** Respondents were asked to select the way they received the programs. If they did not receive the programs through one of the listed means, they were asked to specify how they received the programs. The following comments are the responses generated from this request.
789	I used the worksheets only.
240	Had a NASA ERC make the tapes for me. *Note: Wish there was a quicker way to get the tapes!
847	given to me by principal
235	Received from NASA during a workshop.
4	Do not have yet.
565	I wish they would!
192	Wish I had them!
149	Taping not been of satisfactory quality to use. They have been previewed.
696	mail
815	Did not receive- not available on local PBS station
477	received teacher guides in mail
205	Used the lessons sent to campus

Serial number	**Question #60:** Respondents were asked whether they used the Problem-Based Learning activities for the NASA "Why?" Files programs (please refer to question 59 in the 2001-2002 NASA "Why?" Files Evaluation Booklet). If the respondents selected "no," they were asked to explain why. The following comments were given as a result of this query.
226	slow "hook up" w/ internet
956	Did not receive
807	did not fit
107	not appropriate for below average learners
201	Time
519	Time constraints.
62	Could not get the programs.
240	Haven't got the tapes yet!
906	Downloaded
590	Did not fit in with my curriculum
749	No access.
218	Time - will use at a later date.
847	Time limitations (Incorporated a few as sponge activities.)
25	No access for whole class to PBL.
158	time lacking w/ students
4	Was transferred to another grade level subject. Unable to use but plan to next year.
53	We are the District I.T.V.
684	I do not have on-line access in classroom.

Serial number	**Question #60:** Respondents were asked whether they used the Problem-Based Learning activities for the NASA "Why?" Files programs (please refer to question 59 in the 2001-2002 NASA "Why?" Files Evaluation Booklet). If the respondents selected "no," they were asked to explain why. The following comments were given as a result of this query.
36	I pass my NASA info to our science dept. I teach math. Standards have taken the time from me that I would have used for this.
192	Used the Activities but not the videos.
676	Not enough time.
730	Time restraints
147	Time limitations.
896	did not have/watch video
1	Did not receive this because inst. not to open Email due to pos. virus
696	no time look at ?# 48.
815	explained on line 58
539	I only used the programs I had a teacher guide for.
512	No
54	curriculum
477	We haven't taken advantage of this opportunity yet.
800	I need to review more
91	TV Program director, down linked the programs for cablecast.
298	not enough classroom time
353	We only had time for two
327	Our school is not online.
518	We do not receive the server or PBS in our area; everything was viewed on tape. Only 1 computer in class to work with- could not view online
51	used in limited way--previewed, good!
396	Time constraints.
253	Had to move on to another topic.

Serial number	**Question 73:** Please add any other comments you have concerning the Problem-Based Learning (PBL) activities.
789	I have only used the guides so far. I will use the whole program next year.
335	a great deal of teacher interaction
971	District went to a new program and there was no time to use.
518	Our school is behind in technology; therefore, most of my work is done with tapes from NASA

Serial number	**Question 85:** Please add any other comments you have concerning the NASA "Why?" Files web site.
124	NASA is always good
956	Was not given enough information RE: web site
137	Programming is essential to our broadcast facility and very updated w/the approach used.
789	I haven't checked this yet. I will be more involved with it next year.
25	Site not used.
4	I want to be able to get copies because I was unable to copy from the air when broadcast...but I don't know how or where.

Serial number	**Question 85:** Please add any other comments you have concerning the NASA "Why?" Files web site.
173	Our computers are old and do not download websites well.
192	Excellent work everyone!
16	Have not had time to check it out yet.
147	I enjoyed the teaching experiences.
896	Could not locate under NASA. I'm sure it's just operator error.
641	The web-site learning was not available to us. I wish we could but... Our school is in East New York (Brooklyn) N.Y.C. we can't take 45 Lab classes to the Lab to use the web- scheduling for this is not possible. However, I placed The Lab on The Kite on
568	Unable to get to due to time
539	I only use web site at home because classroom is not equipped for web site use
29	The problems would occur when my browser was not set to read the Why Files. We still have windows 95 in our classroom - website will not work on these computers.
54	I have not gone to web site.
775	The navigation on the site is awkward. The loading...message takes a long time to clear and in today's cyberspace, it's antiquated. I'd also prefer a full screen view, not a small window view on a black background.
51	Excellent, timeless programs. Plan to incorporate them in plans for 2002-2003 academic year. Science will be tested in Florida's State assessment tests in 2003. These programs will prove invaluable in helping to prepare students for the FCAT tests.
541	I used some lessons without video. My students and I enjoyed it immensely.

Serial number	**Question 107:** Respondents were asked to check what objectives they had for student computer use in the classroom. If the respondents checked "other," they were asked to describe the "other" objective. The following are the objectives generated from that request.
754	Determine reliable/valid sites
896	testing
477	webbing, story mapping, and outlining
205	Using the computer as a tool for research and creativity
692	Develop web page.
584	fun

Serial number	**Question 110:** Respondents were asked to mark their present professional duties on a checklist. If the respondents marked "other," they were asked to specify their "other" professional duty. The following are the duties generated from the question.
956	staff developer
137	Master Control
173	Computer Spec.
898	Testing Coordinator, Yearbook Sponsor
512	Staff development trainer
91	TV program director
327	Religion Coordinator

Appendix D. Unsolicited Comments

Serial number	Comment
356	To whom it May Concern: Brother John asked me to fill this out. I am the only teacher in the building who is trying to use technology in the classroom by integrating the curriculum and technology. I am very interested in your program. Sincerely yours
896	Next year, could we please receive the videos with the manuals?
85	I work in a district position bringing the "Why?" Files to our teaching staff. I have answered the questions based on the information I know for sure.
13	Thanks for all your hard work. You make our science a joy to do. We love learning with the "Why?" Files gang.
91	TV director for educational school access channel
203	I am familiar with the "Why?" Files and pass them on to classroom teachers for science and math.
803	Dear Mr. Pinelli, Please remove my name from your mailing list. Our curriculum does not allow me time to utilize your materials. I appreciate all the information you have sent me, and I know that it has been beneficial to many students and teachers.
490	I would like to be able to fill out this survey. The materials I received last year looked great, but I could not find out how to access the videos that went with the materials I received. I replied to a survey last year, but only got a form letter in reply so I still can't use the materials. If you can HELP, I would be delighted to use them and complete all kinds of surveys!
291	Dr. Pinelli, I was not able to use the program this year but would like to be considered for inclusion next year. A copy of your final assessment would be appreciated. Thanks and best wishes.
279	Dear Mr. Pinelli, We air your programming to our receive sites as "specials." Many of these sites do not have access to NASA programs via their line-up. I am not an educator but I can tell you we thoroughly enjoy the programs and have received a favorable response from the schools we reach. Thank you for providing this valuable programming.

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14. ABSTRACT
This report contains the results of the evaluation conducted for the 2001-2002 NASA "Why?" Files program that was conducted in March 2002. The analysis is based on the results of 139 surveys collected from educators registered for the program. Respondents indicated that (1) the programs in the series are aligned with the national mathematics, science, and technology standards; (2) the programs are developmentally (grade level) appropriate; and (3) the programs enhance and enrich the teaching and learning of mathematics, science, and technology.

15. SUBJECT TERMS
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